WORKS BY W. R. WILDE.

NARRATIVE

OF

A VOYAGE TO MADEIRA, TENERIFFE, AND ALONG THE SHORES OF THE MEDITERRANEAN;

INCLUDING A VISIT TO

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With Observations on the present State and Prospects of Egypt and Palestine,

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OBSERVATIONS

UPON

THE EPIDEMIC OPHTHALMIA

Which has prevailed in the Irish Workhouses.

8vo.

In the Press.

THE CONGENITAL MALFORMATIONS AND DISEASES OF THE ORGANS OF SIGHT.

PRACTICAL OBSERVATIONS

ON

AURAL SURGERY

AND

THE NATURE AND TREATMENT

OF

DISEASES OF THE EAR,

WITH ILLUSTRATIONS.

BY

WILLIAM R. WILDE,

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ETC. ETC.

LONDON:

JOHN CHURCHILL, PRINCE'S-STREET, SOHO.

DUBLIN: FANNIN & CO. EDINBURGH: MACLACHLAN & CO.

MDCCCLIII.

DUBLIN:
Printed at the University Press,
BY M. H. GILL.

TO

HIS EXCELLENCY

EDWARD GRANVILLE, EARL OF ST. GERMANS,

LORD LIEUTENANT GENERAL AND GENERAL GOVERNOR OF IRELAND,

ETC.,

THIS WORK IS,

BY HIS EXCELLENCY'S PERMISSION,

Dedicated,

AS A MARK OF RESPECT FOR HIS PUBLIC CHARACTER,

AND OF PERSONAL GRATITUDE,

BY

THE AUTHOR.

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PREFACE.

In the Introductory Chapter I have entered so fully into the circumstances attending the publication of this work, that but few prefatory observations are necessary. I have laboured, and I trust not in vain, to expose error and establish truth; to lay down just principles for an accurate diagnosis of Diseases of the Ear; to rescue their treatment from empiricism, and found it upon the well-established laws of modern pathology, practical surgery, and reasonable therapeutics. In dealing with my subject it was necessary to review the practice and opinions of others: yet, though on certain points a conscientious difference from other writers has been expressed, I have not failed to award merit where merit was due.

My friend and former pupil, Dr. Addinell Hewson, of Philadelphia, has consented to edit the American edition of this book, now in course of publication by Messrs. Blanchard and Lea; and my friend Dr. von Haselberg, of Stralsund, has kindly undertaken the translation of it into German.

Dublin, 21, Westland-row,

June 12, 1853.

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A TREATISE

ON

DISEASES OF THE EAR.

CHAPTER I.

INTRODUCTION AND BIBLIOGRAPHY.

Introductory Remarks on Aural Surgery.—Former means of diagnosis, and general knowledge of the subject.—Early History of the Art.—Writings of the Ancients from Hippocrates to Galen.—Discoveries of the Anatomists of the fifteenth century.—Irish Translations.—Mercurialis.—Instruction of the Deaf and Dumb.—Heurnius.—Introduction of the Speculum by Fabricius.—Bonet and Du Verney.—Kennedy.—Eustachian Catheterism by Guyot.—English Aurists: Cleland and Wathan.—Leschevin.—Degravers.—Valsalva and Cassebohm.—Sims and the London Medical Society.—Graham and Elliott.—Quacks and Quackery.—Perforation of Mastoid Process.—Cheselden.—Perforation of the Membrana Tympani by Sir A. Cooper.—Saunders.—Curtis and his followers; Stephenson, Williams, Wright, Webster, Hepworth, and Gardner.—Buchanan, Earle, Tod, Swan and Caswell.—The French School: Laennec, Itard, and Deleau.—The German School: Kramer, Schmalz, Lincke, and Frank.—The Modern English School: Toynbee, Pilcher, Wharton Jones, Williams, Yearsley, Harvey, Dufton, and Wakeley.—Turnbull and his Reviewers.—Requisites for an Aural Surgeon, and what Aural Surgery can effect.

IN the following Treatise I purpose writing, for the information of practitioners and students in medicine, the history, symptoms, causes, mode of treatment, and results of the most frequent and remarkable diseases of the Ear. With respect to my competency to this task, I have but to remark, that I have had very ample opportunities for studying these diseases during the last ten years in an extensive practice, and in the management of a large public institution in Dublin, for a long time the only one of the kind open to the student where clinical and practical instruction in Aural Surgery was delivered in Great Britain.

This work is the result of the experience thus acquired. Detached portions of it, clinical lectures, and cases observed at St. Mark's Hospital, have already appeared in the periodicals of this country, and some of these essays have been translated and published separately on the Continent. All these, together with much additional information gleaned since their publication, are embodied in this book, which does not profess to be a complete system of Aural Surgery, giving a full description of all the diseases of the Ear which have been recorded by authors; but is intended to supply the reader with a practical treatise on the most frequent and urgent affections of the organ of hearing, and those that I myself am best acquainted with. It may, therefore, be regarded somewhat in the light of a monograph, a form of publication peculiar to this School, and one generally containing more useful and practical information than either a large systematic work or a manual.

In studying the diseases of the Ear, my object has been to take as a basis the principles of pathology: and to reduce their treatment, local as well as general, to the recognised rules of modern therapeutics and scientific surgery; but, above all, I have laboured to divest this branch of medicine of that shroud of quackery, medical as well as popular, with which, until lately, it has been encompassed.

Country friends often ask me, "Have you found out any new cure for *deafness?*" I do not profess to invent or introduce new remedies. I try to make the well-established rules of practice in the treatment of other organs applicable to the management of aural diseases. Like most students, I was taught during my apprenticeship theoretically to believe, and practically to observe, that we "knew nothing about the diseases of the organs of hearing." This was the dictum honestly expressed by the "heads of the Profession,"—men from whom the public were willing to receive a fearless, candid opinion, either immediately on being consulted, or after a few trials of the "ordinary means;" to wit, syringing with hot water and soap, either Castile, soft, yellow, or old brown Windsor, *in the hope* that the deafness or the noise in the ears might arise from a collection of hardened wax;—then setting the digestive organs to rights by purgation, and a "course

of bitters," lest the affection *might be* "owing to the stomach." The human stomach has much to answer for in deranging the system generally, no doubt; but the mischief of which it is daily accused, as every one extensively engaged in practice is well aware, is beyond belief. There is scarcely a disease which we treat, no matter how local, upon which, if we question the patient as to its duration, that he will not say, "Oh! it is, indeed, of pretty long standing, but I was waiting to have my stomach put to rights, as I am told I am very bilious." Next in order, blistering behind the ears is tried, in order to draw away some peccant humour that had, *perhaps*, accumulated round the delicate organ of hearing. These and such like methods failing to give relief, stimulants, often of a very acrid nature, are poured into the external auditory passages, either to restore the secretion,—under the impression that what is a mere attending symptom is the disease,—or to excite or rouse the dormant nervous power; and hot tinctures, turpentine, creasote, and pungent essential oils are applied to the external surface of the tympanal membrane without mercy. Some practitioners resort to more palliative means, recommending some warm almond oil to be dropped into the ear at bedtime, or *eau de Cologne* to be rubbed upon the side of the cheek adjoining the auricle, at the same time advising a little black wool to be retained in the meatus, in order to preserve the organ from cold. To give, however, fair play to the latter remedy, it should be prescribed in full, and according to the old popular superstition, but one which is still extensively resorted to,—the wool should be procured from the left fore-foot of a six years' old black ram! Some advise a slice of fat bacon to be inserted into the meatus every second night; and glycerine is now the fashionable remedy. All these means having failed to give relief, the patient is frequently recommended—an easy mode of getting rid of him—to give galvanism and electricity a fair trial; and if they do not succeed, change of air and scene, sea-bathing, or a "course of waters" at some of the fashionable places of resort for that purpose is prescribed. Despairing of relief from the legalized practitioner, and getting disheartening

opinions from men of eminence and repute, we need not wonder that suffering patients throw themselves into the hands of quacks and nostrum-mongers.

Moreover, the difficulties which beset the student in acquiring a knowledge of the anatomy of the ear, owing to the exceeding minuteness of the organ itself, the great difficulty of dissecting it, from its depth, the complexity of its structure, and the small, hard bone in which it is placed, as well as the number of crabbed names attached to its different parts, all of which have made it a sort of anatomical crux, which no one wishes to remember longer than the day after he has passed his examination, have conduced not a little to strengthen the belief in the doctrine promulgated by his instructors, that little or nothing could be done to reach the diseases of so delicate and intricate an organ.

Now, notwithstanding the remarks which we hear daily in society, or which we meet with in the periodic and "manual" literature of the day,—that the treatment of diseases of the ear is an opprobrium to medicine,—the progress which this branch of medical science is making is in all probability as rapid as that in any other department of the healing art. Among the many causes from which this opinion has arisen, there are two which must pre-eminently attract the attention of any person conversant with the subject, or who will calmly examine into the question. The first is, that heretofore the treatment of those diseases has been committed to the hands of the most uneducated quacks and charlatans, male and female,—persons totally unacquainted with the first rudiments of medical knowledge; the second, that medical men themselves—most astute and practical physicians and surgeons in all other respects—treat diseases of the ear certainly in a manner that savours of empiricism, by prescribing nostrums, of both a local and general character, which we know they would never think of using in similar forms of disease in any of the other organs of the body. This latter cause evidently results from want of proper attention to the subject in our schools, and from the practice of prescribing at random for diseases, the diagnosis and pathology of which are generally unknown.

To both these causes may be added others that, to a certain degree, serve to bias the public mind against the treatment of aural diseases. In many cases, there is either an unconsciousness of the insidious approaches of deafness, or an unwillingness to admit even the possibility of such an occurrence; or, again, there is an apathy, to a greater or less degree, on the part of those affected with deafness, and a delay in seeking advice, which is scarcely credible. Persons who, if they suffer the least inconvenience in any of their functions, or the slightest interference with the due exercise or healthy condition of any of the other organs of sense, would immediately apply for medical relief, and submit to any, even the most severe form of treatment, will patiently permit the sense of hearing to be greatly impaired, nay, even lost on one side, without making any effort for its restoration. When the lapse of months, and even years, have contributed to confirm disease and render such persons incurable, they generally respond to inquiries with regard to previous treatment,—that they did not like to be "tampering" with their ears, or, that they were told nothing could be done for them.

It would in no wise conduce to the practical effect to which I hope this work may tend, to inquire into all the causes of these results: I may, however, mention, that medical men themselves have in part conduced to produce this want of faith on the part of the public, either by direct opinion as to the incurable nature of the disease or diseases known by the symptom of deafness, or by such futile treatment as broke down the confidence of the patient in any remedy for diseases of the organs of hearing. It is true that cases of what are termed "nervous deafness," that is, of defect in the hearing function of the acoustic nerve in any part of the internal ear, from paralysis or other causes,—or of those portions of the brain which preside over the faculty of hearing, or give origin to, or are connected with the portio mollis of the seventh pair of nerves,—in fact, such cases as are analogous to amaurosis,—are as intractable as that disease of the eye;—yet I fear not to reiterate the assertion which I made upon several former occasions, that if the diseases of the ear were as well studied or understood by the generality of practitioners, and as early at-

tended to, as the diseases of the eye, it would be found that they were just as much within the pale of scientific treatment.

We have now several special works upon aural surgery, as well as some valuable monographs thereon in the cyclopædias and periodicals, yet it is to be regretted that the modern systems of surgery contain but scanty information upon the subject of diseases of the ear. The following passage from M. Druitt's well-arranged "Surgeons' Vade Mecum" (which is an exception to the class) is so apposite to the foregoing observations, that I insert it:—"Deafness is so common and so distressing an infirmity, and, when of long standing, is so incurable, that we cannot too strongly urge all medical practitioners to make themselves familiar with the treatment of diseases of the ear. They should also encourage their patients to apply to them for the relief of *slight* and *incipient* ailments in this organ, instead of allowing them to go on till they become permanently deaf, and then letting them fruitlessly seek relief from ignorant and mercenary quacks."

THE EARLY HISTORY OF AURAL SURGERY.

In the present day, when literature in every Protean shape and form has compassed the land, and knowledge may truly be said to run to and fro throughout the earth; and when the polyglot cyclopædia of the Press has outstripped in the race all other feats of human prowess of the nineteenth century, it might be deemed unnecessary to follow the old school system of detailing the early history of that particular branch of medicine of which this essay treats, were it not that in an art but just emerging from the darkness, ignorance, empiricism, prejudice, and superstition, which is to a certain extent even yet the condition of aural surgery, its history not only becomes interesting, but practically instructive. Furthermore, as this work is not put forward as a system containing a compilation of opinions, or abounding in extracts and references, but is chiefly the result of my own experience, the following notices of the writings of others is given with a view of directing the student to the most accessible sources of information on the subject.

I might, with the generality of writers upon the history of medicine, commence with the times of Hippocrates, for he makes several allusions to the affections of the organs of hearing, not, however, as idiopathic forms of disease, but as symptomatic of other maladies of an acute or chronic nature; but it must be borne in mind that at that period of medical science (and, I regret to add, that it has in a great part descended to the present day) the affections of the ear, whether functional or organic, were spoken of, lectured on, written of, and described, not according to the laws of pathology which regulate other diseases, but by a single symptom, that of *deafness*. "If," says Dr. Kramer, "I mention that the treatment of deafness (viz. as it occurs as a functional disorder only of the ear, without any perceptible external alteration of the organ) merely consists of not washing out the ear, but cleansing it with wool, dropping in oil, directing the patient to walk out, rise early, drink white wine, abstain from salads, and allowing him to eat bread, and such fish as inhabit rocky shores, I shall have collected all that is of most importance to give an idea of acoustic medicine at that time."

To Celsus, the successor of Hippocrates, we are indebted for the first acknowledgment of the specific or independent forms of aural disease; for having introduced the practice of ocular inspection of the auditory canal; and for some general rules for the treatment of the inflammatory affections of the organs of hearing. But this advance in aural medicine, which we owe to Celsus, is more than counterbalanced by his introduction into practice of those stimulating nostrums which were then, and have been since, applied to the membrana tympani without discrimination; and many of which are made use of in the present day.

Galen followed in the track of his great predecessor, and although he advanced somewhat in symptomatology, and was evidently better acquainted with the causes of the inflammatory diseases of the ear, yet he and his disciples so increased the number of remedial agents which were applied to the external meatus, that we find aural medicine and surgery, toward the end of the fifteenth century, but a collection of hard names, unconnected symptoms, fanciful and absurd theories based on causes the most

improbable, and a category of medical substances from the animal, mineral, and vegetable kingdoms, principally, however, composed of hot spices and stimulating applications, of which I may mention castor, ox-gall, garlic, frankincense, opium, nitre, euphorbium, alum, iron filings boiled on vinegar, hellebore, myrrh, and many other such substances, each lauded by their respective admirers, and extolled as panaceas for deafness in all its numerous forms and modifications; as we find glycerine is at the present day. Those who still prescribe such nostrums, and they are many, might consult with advantage old "Gabelhover's Boocke of Physicke," printed in 1559.

It would afford us neither literary interest nor practical utility, commensurate with the task, to detail the notions concerning the treatment and diseases of the ear, as they may be found scattered throughout the writings of Aurelianus, Paul of Ægina, Razes, Serapion, Hali Abbas, Mesue, and Dioscorides; the works of the three latter of whom were translated into Gælic by several distinguished Irish physicians from the beginning of the fourteenth to the end of the sixteenth century.*

At the conclusion of the fifteenth century the anatomy of the ear received a new impulse, by the investigations and discoveries of some of the most distinguished anatomists and physicians of that age, in compliment to whose labours subsequent writers gave those parts names which we retain to the present day, as, the tube of Eustachius, the aqueduct of Fallopius, the liquor of Cotunno, and the fissure of Casserius; but although these celebrated men made the world better acquainted with the anatomy of the organ of hearing, and thus removed one of the chief obstacles to the investigation of aural pathology, their successors in medicine advanced but little in the diagnosis and treatment of diseases of the ear.

The first special work upon the ear that I have been able to discover is that of Heurnius Mercurialis, "*De oculorum et aurium*

* See the author's Introduction to the memoir on Vital Statistics in the Census of Ireland for 1841: and also a Lecture on the Early History of Irish Medicine, delivered at the College of Physicians, and published in the Medical Gazette for 18th February, 1848, *et seq.*

affectibus Prælectiones," the first edition of which was published at Frankfort in 1584. Mercurialis was chiefly a compilator from the works of the Greeks, Romans, and Arabians, and as an original investigator deserves no credit; but he collected all that was known and had been written before his day on aural diseases; the little he did add was that of a few more *nostrums*, and, therefore, he may be consulted with advantage by those of the fraternity who still adhere to the good old rule of applying such remedies as hot onions in acute inflammations of the meatus or tympanum.

In the sixteenth century the attention of philanthropists was first turned towards the lamentable condition of the deaf and dumb. Prior to that period, during those ages wont to be called enlightened, and in those countries styled civilized and even refined—among the Egyptians, Greeks, Romans, and Hebrews, the deaf mute was, and even still in the Orient is, but little removed from the brute, and is often employed for the basest and most degrading offices, such as humanity in the present day, in this country at least, shudders at. Up to that period the deaf and dumb were not considered susceptible of improvement or instruction of any kind, and their very passions, unrestrained by any influence, human or divine, were frequently made to minister to the cruelty or sensuality of those around them. I need not further enlarge upon this subject here, as it is considered at length in the section of this work devoted to deaf-dumbness.

The first book that treated of our subject in the seventeenth century was a posthumous Latin work of Joseph Heurnius, on the diseases of the organs of hearing, published by his son, the celebrated Otho Heurnius, in 1602. Lincke, however, says that he was but a compiler. Heretofore the treatment of aural diseases consisted, as already remarked, for the most part, in medicinal agents and empirical nostrums; but in 1646 the principles of surgery were brought to bear upon this class of affections by the master-mind of Fabricius von Hilden. His observations on the extraction of foreign bodies, on polypi, and other diseases of the external auditory conduit, are well worthy of perusal; and to him is generally ascribed the invention of the first speculum auris, as well as the first ear instruments on record. His speculum was

formed on the principle of the common forceps-like instrument still in use; but from the following passage in a still older writer, Peter de la Cerlata, "*per inspectionem ad solem trahendo aurem et ampliando cum speculo aut alio instrumento*," we are led to believe that means were employed before his time for examining the external auditory passage. Instruments of this kind, and for this purpose, having been once recognised and employed by practitioners, have since been variously modified, according to the ingenuity of the inventor;—yet their first introduction into practice decidedly formed an epoch in aural surgery. Fabricius's observations, and the description of his instruments, will be found in his "Opera Omnia."

The next work of any merit that appeared in connexion with aural medicine was published by a Genevese anatomist, Theophilus Bonet; his observations, as they are set forth in his great work, the "*Sepulcretum vel Chirurgica Practica*," were chiefly confined to the pathology of the ear from dissection; but in a practical point of view he advanced little beyond the limits attained by his predecessors.

Towards the conclusion of the seventeenth century aural surgery received a new impulse from the talents and laborious investigations of the distinguished French anatomist, Du Verney. Of late it has become the fashion to decry the labours of this great man—in my humble judgment, unjustly—for he was far in advance of his time, and although the pathological is not as voluminous, nor perhaps as accurate as the anatomical part of his writings on the organ of hearing, still he was a lucid painter, and a graphic describer of disease. He was the first person who arranged the diseases of the ear according to the anatomical structures affected, as, into those of the outer ear and meatus, those of the middle ear or tympanum, and those of the internal ear or labyrinth. From the times of Eustachius to the period on which we are now engaged, we have no work upon the anatomy of the organ of hearing equal to that of Du Verney, and to this day it may be consulted with advantage. We likewise are indebted to Du Verney far more than is generally acknowledged, or, perhaps, writers are aware of, for having given the first impulse to anything like

a knowledge of aural anatomy and surgery in England; for his book, which was published in Paris in 1683, was translated into English after his death, and published in London in 1737, being thus, though a translation, the first special treatise in point of time upon aural medicine or surgery in our language. This is now very scarce, yet there can, I think, be little doubt but that Mr. Saunders availed himself largely of it. However, to Du Verney, and not to Lallemand and Itard, we are indebted for the prejudice that up to this day exists with regard to the treatment of otorrhœa. But the latter were the more reprehensible, as from the age in which they lived, and the giant growth of medical knowledge subsequent to the time of the former, they should have known better; but I believe, like many modern practitioners, they chose rather to transmit the prejudices of one hundred and fifty years before, than take the trouble of investigating for themselves.

Without entering minutely into the history of aural medicine during the latter part of the seventeenth century, which, after all, would consist in the enumeration of the Latin writings of various Continental authors, more curious than instructive, let us pass on to the penultimate century of our own period, when aural medicine first dawned in Great Britain.

In 1713, Peter Kennedy published in London a little work styled "Ophthalmographia, or, a Treatise on the Eye," to which is added an Appendix of some of the diseases of the ear, wherein is observed the communication between these two organs; the latter part consists of about ten pages.

It is remarkable, that the discovery which Eustachius made of the tube which bears his name had no practical influence upon this branch of medicine, and that for nearly two hundred years surgery made no effort at availing itself of this knowledge, for the purpose of remedying diseases of the ear. In 1724, M. Guyot, a postmaster of Versailles, proposed to the Parisian Academy of Sciences to inject the Eustachian tube, by means of a catheter introduced through the mouth, for the removal of obstructions in that canal, and also in the middle ear. It seems, however, that the French academicians were not sufficiently aware of his valuable discovery, or at least proposal, for it is a question whether he ever performed the operation himself.

In 1741, Archibald Cleland, an English army surgeon, published in the Philosophical Transactions an account of "instruments proposed to remedy some kinds of deafness, proceeding from obstructions in the external and internal auditory passages." The first of these consisted "of a convex glass, three inches in diameter, fixed in a handle, into which is lodged some wax candle, which when lighted will dart the collected rays of light into the bottom of the ear, or to the bottom of any cavity that can be brought into *a straight line*." Insignificant and incomplete as this instrument of Cleland undoubtedly was, it is, nevertheless, deserving of our attention, inasmuch as to it may be traced the subsequent *inspector auris* of Deleau, of Itard, Buchanan, and Kramer. The principal object of Cleland's inspector for throwing a stream of artificial light into the meatus was for the purpose of discovering the presence of hardened cerumen, which he removed by means of a jet of medicated steam, "but if," says he, "this has not the desired effect, and the person still remains deaf, the following instruments are made to open the Eustachian tube; if upon trial it should be found to be obstructed, the passage is to be lubricated by throwing a little warm water into it, by a syringe joined to a flexible silver tube, which is introduced through the nose into the oval opening of the duct, at the posterior opening of the nares, towards the arch of the palate." This catheter had affixed to it a sheep's ureter, to the other end of which was attached the syringe, "whereby warm water may be injected; or they will admit to blow into the Eustachian tube, and so force the air into the barrel of the ear, and dilate the tube sufficiently for the discharge of the excrementitious matter that may be lodged there." He likewise used probes, of the same size as the catheters, to explore the tube. Cleland was either unaware of, or disbelieved, the account of Guyot's having introduced an instrument into his own Eustachian tube through the mouth, nineteen years before; for in his essay in the Philosophical Transactions he does not once allude to the circumstance. To the English surgeon, however, is undoubtedly due the merit of having first introduced a catheter into the Eustachian tube through the nose, the only certain way, I believe, of performing such an operation.

In May, 1755, Mr. Jonathan Wathan published a more de-

tailed essay in the Philosophical Transactions, on "a method proposed to restore the hearing when injured from an obstruction of the tuba Eustachiana. This gentleman, who seems to have been a good practical anatomist, as well as a dexterous surgeon, had an opportunity of making a post-mortem examination in a case of deafness, wherein it was found that both Eustachian tubes were "stuffed quite full of congealed mucus." If Cleland overlooked, or was unacquainted with the proposed operation of the Versailles postmaster, Wathan seems to have completely overlooked the more recent and effectual discovery of Cleland; but in allusion to the post-mortem examination to which I have just referred, he says, in the commencement of his very admirable essay: "As all these concurring circumstances strengthen me in my opinion, they likewise incited me to make trial of an operation that was some time ago proposed to the Academy of Sciences by M. Guyot, but the author having *never* practised it, he wanted the recommendation of facts to support and enforce it, it was, therefore, rejected by them as impracticable." And in a note, he adds, that Guyot having recommended the introduction of it through the mouth, which is quite impossible, "Petit proposed, and that learned and skilful anatomist, Mr. John Douglas, first demonstrated the possibility of passing the probe through the nose into the Eustachian tube, and to him I freely acknowledge myself indebted for the hint." The catheter used by Mr. Wathan was not much larger than a common-sized probe, and was bent a little at the end, very nearly in the same form as that used by Kramer, the distinguished Prussian aurist; and with this and a syringe he injected and washed out the Eustachian tube and middle ear. There can be no mistake about the mode of Wathan's proceeding, for he has given a very good representation of the operation in a plate attached to his essay in the Philosophical Transactions.

I have dwelt thus long upon the introduction of instruments into the Eustachian tube, as that operation formed the second, and, perhaps, one of the greatest epochs in the history of this art, because the merit is due to our own countrymen, and because the English works upon aural surgery are not sufficiently explicit upon this point, and many of the Continental ones are altogether

uninformed with regard to it,—Dr. Kramer, in his critical literary review, being under the impression that Guyot had really introduced the catheter through the *mouth.*

The essays of Cleland and Wathan, imperfect as they were, were decidedly the greatest addition to aural surgery made in the eighteenth century, and had the discoveries and valuable observations of these practical men been followed up in England, it is probable we would now be far in advance of our Continental neighbours. I would strongly recommend a perusal of Wathan's paper, as the cases he describes are most valuable in the diagnosis of obstruction of the Eustachian tube.

So early as 1842 I was familiar with, and have since frequently pointed out to many of my medical friends and pupils a peculiar form of deafness, in which the membrani tympani had fallen in towards the inner wall of the middle ear,—had lost much of its vibratory power, and in which, when examined under a good light, the handle of the malleus may be seen appearing to press outwards in strong relief. In this affection, which, I have reason to believe, is very often mistaken for nervous deafness, we have what may be termed *short hearing,* from an alteration in the vibratory membrane of the ear, in like manner as we have *short sightedness,* or myopia, sometimes arising from a peculiar alteration in the curve of the cornea. I find, however, upon carefully perusing the paper of Cleland, that he had some idea of what I have here described, and of its being produced, as I have known it to be in some cases, by accident. "There is," he says, "another kind of deafness, which proceeds from a violent clap of thunder, noise of a cannon, or the like. In this case it is probable that the position of the membrana tympani is altered, being forced inwards upon the small bones, and so becomes concave outwardly. In this case no vibration of sound will be communicated to the drum until the membrane has recovered its natural position."*

During the remaining half of the eighteenth century I have little to record; the art does not appear to have advanced a single step, either in Britain or any other part of Europe, Books and

* Philosophical Transactions, vol. xli. part. ii. p. 850.

essays were written, no doubt, but their authors added little to the labours of their predecessors. The great majority of these writings emanated from the German press, as, for instance, those of Gniditsch, Wildberg, Milloradovics, Kritter, Arnemann, and Lentin. Of the French school may be mentioned Desmonceaux and Leschevin; the writings of the latter will be found in the Memoirs of the Royal Academy of Surgery of Paris for 1763. Having lately had occasion to examine this dissertation, which was undoubtedly the best of its day, I am bound to say that the lavish praise bestowed upon it by the French, and the severe criticisms of the German writers, within the last few years, were alike unmerited.

Up to the close of the eighteenth century no special work upon the diseases of the ear had appeared in England, with the exception of the translation of Du Verney, to which I have already alluded. English works have, it is true, been enumerated by foreign writers, but they were not written upon the diseases, properly so called, but on the congenital defects of the organs of hearing. These I have specified in that portion of the work relating to the instruction of the deaf and dumb.

In 1788 Dr. Peter Degravers, who styled himself Professor of Anatomy and Physiology, published in Edinburgh "A Treatise on the Human Ear," as an Addenda to the second edition of his "Physico-Medical and Chirurgical Treatise on the Human Eye." This tract consists of 62 pages, and is divided into three Parts:—The Anatomical Exposition; The Physiological Inquiry into the Origin of Sounds; and the external and internal Disorders of the Ear. The work, though very much beneath that of the author's Observations on the Diseases and Operations of the Eye, is yet intelligible enough, and came up fully to the state of knowledge on aural surgery at that time. It is generally believed that Sir Astley Cooper was the first person who perforated the membrana tympani. Degravers, however, tells us in his essay that he completely removed the tympanal membrane in one case; and again he says:—"I incised the membrana tympani of the right ear with a sharp, long, but small lancet. I left the patient in that state for

some time, and afterwards observed that it had re-united. . . . . I incised again the membrani tympani of the right ear but crucially; and on removing the parts of the membrane incised, I discovered some of the ossicula, which I brought out."

During the eighteenth century the anatomy of the organ of hearing was further studied by Valsalva, in his work "De Aure Humana Tractatus," published at Bonn in 1704; and by I. F. Cassebohm, whose book, "Tractatus Quatuor Anatomici De Aure Humana, Tribus Figurarum Tabulis Illustrati," appeared in 1734. These writings, with subsequently those of Scarpa, Soemmering, and, in later times, of Arnold, have rendered the anatomy of the organ of hearing very complete. Mr. T. Wharton Jones has embodied all that was known upon the subject when he wrote the article "Organ of Hearing" in the Cyclopædia of Anatomy in 1838.

The members of the Medical Society of London, instituted in 1773, and composed of the physicians, surgeons, and apothecaries of that time, were not insensible to the low condition in which aural medicine stood toward the end of the last century, and in their valuable memoirs will be found some scattered notices upon the diseases of the ear, from the pens of the president, Dr. Sims, as well as from Mr. Houghton, Dr. Zeucker, a Prussian, and Dr. Roslet of Ostend. Most of these papers contained post-mortem examinations of cases of deafness, a practice that, with the honourable exception of Mr. Toynbee, has not, I regret to say, been followed up, and very much to the detriment of aural medicine. In Dr. Sims' essay he entered into a physiological discussion regarding the nature of the Eustachian tube, the object of which was to show, that while we heard all *external* sounds through the meatus externus, we were conscious of our own voice only through the Eustachian tube. The practical part of his paper is, however, exceedingly valuable, particularly with respect to the manner of pressing air through the tube into the middle ear, by closing the mouth and external nares, and then making a forced expiration; but this had been already explained by Cleland in 1741.

In 1775 James Graham published in London "Thoughts on the Present State of the Practice in Disorders of the Eye and Ear,"

8vo.; and in 1780 J. Elliot made his "Philosophical Observations on the Senses of Vision and Hearing." Still, at the conclusion of the last, and about the beginning of this century, aural surgery and medicine were at a very low ebb, particularly in Great Britain. This want of knowledge by the regular practitioner upon the subject of diseases of the ear was, however, soon taken advantage of, not only by professed quacks and nostrum-mongers, but by the electrical, galvanic, and magnetic doctors of that day, who corresponded to the homœopaths, hydropaths, and mesmerisers of the present. At the period to which I allude, galvanism, magnetism, and electricity, together with the celebrated *metallic tractors*, were applied to the ears of persons labouring under deafness, and numerous and wonderful were the cures vaunted in the periodicals of the day, as having been effected by these remedies; —cures almost equalling those lately said to be performed on the eye by prussic acid: while secret, but never-failing acoustic drops, stimulating embrocations, and the like impostures, were pawned upon the public by all those who had ingenuity and effrontery enough to make money after that fashion. And here let us for a moment digress from the direct course of our subject to answer a question that is often propounded—Why is it that the empiric and the pretender, either licensed or unlicensed,—for in these days there are as many and as impudent quacks with as without diplomas,—why is it, one is often asked, that the charlatan frequently succeeds in practice better than the honest practitioner? By the term success, we do not mean professional success in his art, but pecuniary success in life, and esteem among those with whom money "makes the man." Now although we cannot always answer this query, nor would the same explanation be applicable to every instance, we can, however, assert one fact, which in a great measure contributes to the success of the quack, and it is this,—the hearty response of his patients to the lesson picked up from the showman—"speak a good word to your friends outside." Let any well-educated, honest practitioner be called on to treat an urgent and alarmingly dangerous case, where insidious death stands at the sick man's door—let him bring all the powerful acquirements of long years of patient study and observation

of disease—his anatomical and pathological knowledge—an eye practised to disease, and a head stored with the sound, rational, scientific, practical principles of his art—let him add to this the kindness of a friend, nay, often the benevolence of a benefactor—let him pass anxious days and sleepless nights watching each turn of disease in his patient, and ministering to every of the many wants that attend the bed of lingering sickness—let him do all this, and finally (under Providence) restore the patient to health and to his friends—stand, as we may say, between the living and the dead, beckon back the approaching king of terrors, and give again to society a valuable life, and to the trembling, anxious family their only earthly means of support—what is his reward? He is, generally at least, paid his fee, and the patient and his friends are generous enough to say they feel grateful for all his kind attention, for we will not curtail it of whatever good feeling may be shown on the occasion. But compare this with a patient who imagines he is cured of an imaginary disease by a water doctor, or an atom doctor, an electro-biologist, a mesmeriser, or a magnetiser,—is he not immediately converted into a partisan? —does he not become a missionary for the nostrum-monger?—does he not go about from house to house detailing the miracle of his cure, the skill of the doctor, the horrors of the regular practitioner, and the great benefit conferred upon mankind by being converted into hydraulic machines; or expressing his surprise that people will go about their ordinary business "clothed and in their right mind," like the man from whom the seven devils were cast out, instead of being wrapped in a wet sheet, or enjoying a sitz-bath for ten hours a day; while others will wait upon you specially, to beg and entreat you will not convert your poor stomach into an apothecary's shop by taking all that "doctor's stuff," instead of procuring rest and ease to all your ills by just such an anodyne as would be formed by pouring one drop of laudanum into the Bosphorus, where it leaves the Euxine, and drinking a thimble-full of the same water where it enters the Mediterranean! But, not content with this, these medical missionaries abuse all regular practitioners, and often force (for humanity's sake, as they say) the charlatan upon the patient, who then trusts to his address for future fame and profit.

In 1793 Jasser revived the old operation of perforation of the mastoid process for the purpose of injecting the middle ear; but as the success attending this procedure must be very doubtful, and the hazard very great, it is never resorted to in the present day.

Several experiments had been tried by anatomists and physiologists upon dogs and other animals, in order to discover whether the function of hearing could be carried on with a perforate, or imperfect membrana tympani. These investigations upon the lower animals being deemed inconclusive, Mr. Cheselden, the father of English surgery, proposed to experiment in this matter upon the living human subject, and for this purpose a condemned criminal was pardoned, on condition of submitting to the operation! but a popular outcry prevented its being put in force!* Some years afterwards, Sir Everard Home, in his article upon the muscularity of the membrana tympani, having expressed his desire to know the result of perforation or destruction of this membrane, Mr., afterwards Sir Astley, Cooper, published a letter in the Philosophical Transactions for the year 1800, entitled, "Observations on the Effects which take place from the Destruction of the Membrana Tympani of the Ear." Although this paper did not advance our practical knowledge upon the subject, yet it called the attention of British surgeons to the treatment of this important organ, and put an end to a very generally received notion among the profession, that hearing would be totally lost on the opening of the membrana tympani; notwithstanding that a couple of hundred years ago it was believed by anatomists that an aperture existed in this structure, as a normal condition during life.

In the following year Cooper published an essay in the same work on the perforation of the membrana tympani, as a means of removing deafness caused by obstruction of the Eustachian tube,

* This case is referred to in Walpole's Reminiscences, where it is stated that the criminal was Cheselden's cousin, and that he was pardoned at the intercession of Lady Suffolk (mistress to George II.), who, being herself deaf, wished to have the experiment tried. The surgeon lost the royal favour, it is said, by the circumstance. This story may, however, be but one of the petty scandals of the day.

and a consequent want of vibration in the tympanal membrane. This paper commenced a new era, and opened up a wide field in aural surgery. Like all discoveries in medicine, however, it was at the time, and in other hands, too frequently had recourse to, and often misapplied. The brilliancy of this operation, and, in some instances, its instantaneous effects, urged men to employ it who were totally ignorant of its application, as well as of the structures and diseases of the organs of hearing generally; so that it soon fell into disuse, and although recommended by this high authority, the superior instruments we now possess of diagnosing with greater accuracy the condition of the middle ear, and its internal faucial aperture, by means of the air-douche, and also owing to the comparatively few cases of deafness *solely* depending on closure or stricture of the Eustachian tube, have rendered its performance much less frequently necessary than was at first supposed. Himley, Itard, Deleau, Fabrigi, and others, improved and modified the instruments and the operation of Cooper. This may be termed the third epoch in our art; the two first being the application of the speculum by Fabricius, and the introduction of Eustachian catheterism by Cleland.

I cannot conclude this notice of Sir Astley's improvement, without quoting the pertinent and judicious remarks with which he closes his memoir—advice and remarks which, I regret to add, have been but little attended to, but which are as applicable to the present time as they were to the period when they were written.

"I hope others will be induced," he says, in alluding to the success of his operation, "to second my feeble efforts, and to direct their attention to a subject which appears to be of the highest importance, and to have been too much neglected by medical men; for a knowledge of the structure of the ear is by no means general in the profession, and still less are its diseases understood. A prejudice has prevailed that the ear is too delicate an organ to be operated upon, or, as it is commonly expressed, *tampered* with; and thousands have thus remained deaf for the rest of their lives, who might have been restored to their hearing had proper assistance been early applied."

Not to burden the reader with too minute and extended a

bibliology or critical review, I will now compress the history of our art, with few exceptions, into the labours of British aurists. The well-marked inflammatory diseases of parts of the auditory apparatus, such as the auricle, external tube, and tympanum, were generally treated, by all well-educated surgeons, as in the present day, by strict antiphlogistic means, the local abstraction of blood, purging, and counter-irritation ; but here the judicious interference of art ceased; and it would have been well if all further meddling had been avoided; but laudanum was regarded as a panacea in all cases of ear-ache, no matter from what cause it may have arisen; and drops, oils, and liniments, some of them of the most caustic nature, were, without mercy and without discrimination, poured into the external meatus by those, who like the regicide of old—

> "Stole
> With juice of cursed hebenon in a vial,
> And in the porches of the ears did pour
> The leperous distilment."

First upon the list of British writers upon the acoustic apparatus and its diseases stands John Cunningham Saunders, the distinguished oculist, and the founder of the London Infirmary for Diseases of the Eye, on whose merits, as an original observer, a sound practical surgeon, and a critical anatomist, I need not expatiate. His work, "The Anatomy of the Human Ear, illustrated by a series of engravings of the natural size ; with a Treatise on the Diseases of that Organ, the Causes of Deafness, and their proper Treatment," was published in 1806, and although, as I already said, he availed himself of the labours of Du Verney, still to Saunders we are indebted for the first special English work of any merit upon this subject, and to him the various charlatans that have ventured to set forward their ideas in print are indebted for the mine from which they drew the material of their various and voluminous publications. Saunders, as an aurist, has been unjustly dealt with: he wrote, not merely in accordance with, but beyond the knowledge of, his time, and Kramer not only criticises his work with too great severity, but denies it the place which, in a chronological point of view, it

deserves. This may, however, be accounted for by Kramer's having quoted from, as perhaps he only had access to, the third edition, published in 1829, just nineteen years after Mr. Saunders's death. The practical portion of the work consisted of the history and treatment of the diseases of the meatus externus, and those of the tympanum, of the obstruction of the Eustachian tube, and of the diseases of the internal part of the ear, to which are added cases of incipient nervous deafness successfully treated. The plates are worthy of inspection, and were evidently drawn from recent dissections. Saunders possessed, in addition to his originality, honesty and general attainments in the science of anatomy and surgery, this great requisite for an aurist,—that, having also applied himself to the study of diseases of the eye, he had thus acquired habits of minute observation and delicate manipulation, without which no man will ever attain to eminence in either art. Moreover, the analogy which exists between the diseases, as well as the anatomy and physiology of these two organs, enabled him to bring to the study of the ear the rational principles of medicine then established in the treatment of ocular affections.

For six or eight years we hear nothing of aural surgery in Great Britain, and our space will not permit of our even enumerating the names of the different Continental writers for the first twenty years of the nineteenth century. Cooper's more extended and more lucrative line of practice caused him to relinquish aural surgery,—this, and the untimely death of Saunders, seem to have cast a veil over this branch of knowledge in these kingdoms.

In the years 1815 and 1817 we find two special works on aural medicine; of the first of these, "*Dissertatio de Aure Humana et ejus Morbis*," an inaugural essay, published by Mr. Ball at Edinburgh, there is little even to criticise; and the second was the earliest work of the since far-famed John Harrison Curtis. Let us read its high-sounding title: "A Treatise on the Physiology and Diseases of the Ear, containing a comparative view of its Structure, Functions, and of its various Diseases, arranged according to the Anatomy of the Organ, or as they affect the external, the intermediate, and the internal Ear." Let us draw from the writings of a foreigner the opinion that a man of honesty and prac-

tical experience formed of this and the author's subsequent works. "Curtis," says the writer, "treats every discharge from the ear exclusively, and in a summary way, by means of astringents; obstructions of the Eustachian tube, with emetics and perforation of the membrana tympani; whilst, in spite of all the entreaties of Saissy, he has never once practised catheterism of the Eustachian tube on the living subject. He makes tinnitus the chief symptom of nervous deafness, which he treats with purgatives, especially calomel, as long as the strength of the patient holds out." "In all doubtful cases the chief attention is directed merely to ascertain whether the liquor Cotunnii be partially or totally deficient!! or whether hardened wax exist in the meatus." "In the otitis of children he sticks opium into the affected ear, &c., so that throughout all his writings nothing but the most crude empiricism is to be met with; and yet among his compatriots, as well as abroad, Curtis generally possesses the reputation of being a distinguished aurist." And one of the first English medical periodicals of the day thus expresses its admiration of the same person: "Mr. Curtis, in his Treatise on the Physiology and Pathology of the Ear, has appropriated the *whole* of Mr. Saunders' essay. The exact words, indeed, have, in some instances, been changed, but the plagiarism is too manifest to escape even the most inattentive reader. To this paraphrase of Mr. S.'s work, Mr. Curtis has added some things from other authors, and some histories of cases treated by himself (of course all most successfully), and has thus concocted a treatise which, with singular effrontery, he has put forth as entirely of his own composition, and as containing the results of his own practice. This work has now, for a period of about twenty years, been forced upon the attention of the public by the advertisements of successive editions; and it is a melancholy fact, that there should have been found editors of medical journals either so ignorant or so careless as to lavish commendation on such a production."

Almost in a similar category may be classed the writings of Williams, surnamed the nostrum-monger; and also those of Stephenson and of Wright, "New Observations on the Diseases of the Eye and Ear," 1817. The latter followed something of the plan laid down by Curtis, of simply *recomposing* the words

of his first work; for as to new ideas, there were none, nor old ones to add them to. In order to form either a new edition, or a new book, we find the changes rung to the following tunes for about ten or eleven years: "An Essay on the Human Ear, its Anatomical Structure, and Incidental Complaints," 1819; "The Aurist, or Medical Guide for the Deaf," 1825; "Plain Advice for *all* Classes of Deaf Persons, the Deaf and the Dumb, and those having Diseases of the Ear," 1826,—verily, this must have been a popular book; "Observations on the Effects of Mercury on the Organs of Hearing, and the improper use of it in cases of Nervous Deafness," 1827; "On the Varieties of Deafness and Diseases of the Ear, with proposed Methods of relieving them," 1829. To these was added, "The Present State of Aural Surgery," together with three or four others, all by the redoubted Mr. William Wright. With these productions may be classed those of Webster, Thornton, and Fletcher, works similar in substance and composition, although, perhaps, not so flagrant in plagiarism. Among the writers of that period, and with some even down to the present, it was usual to preface whatever they had to offer to public notice as a cure for deafness by a lengthened description of the structure and physiology of the ear, copied from some of the general or special works upon anatomy. Thus, when one of the persons just alluded to wished to advertise a new instrument, made to fit the back of the auricle, for the purpose of collecting sound, we find that there issued from the London press in 1836, "A new and *familiar* Treatise on the Structure of the Ear and on Deafness, by A. W. Webster, inventor of the Otaphone, &c. &c." Among the illustrations to that work we observe an ill-executed wood-cut, of a very ugly and misshapen auricle, but bearing the attractive inscription of "Mozart's Ear." On perusing the text, however, we discover that it was not the ear of the great musician, but that of his youngest son, "which resembled that of his father!" One specimen from the medical portion of the book will suffice: "The membrane of the tympanum, which I have before described as presenting the appearance of a large opal bead, was frequently *reduced*, both in size and colour, to the resemblance of a *mustard seed*, the burning substances which had been put *within* the ear having effected that change."

But it was not alone among the instrument venders and itinerant aurists that ignorance and quackery were to be found. About eight years ago I was sent a book, bearing the following title, but without a date: "The Causes, Symptoms, and Treatment of Nervous Deafness, Inflammation of the Eye, and Indigestion, popularly treated by J. D. Hepworth, late Surgeon to the Leeds General Eye and Ear Infirmary." In the anatomical description he says, the membrana tympani is "of a dry and brittle tissue, without fibres or blood-vessels." Nervous deafness is ascribed to obstructions in the secretion of the fluid of the vestibule; and hardness of hearing, following measles or scarlet fever, to chronic inflammation of the membrane of, and deposits of lymph within, the semicircular canals! Surely foreigners might well criticise English writers on aural medicine when they read such statements as the foregoing.

Somewhat of the same character is the work of Dr. Gardner on Deafness, consisting of 152 pages, entirely devoted to the anatomy of the ear, with half-a-page at the end explanatory of the contents of the second part, upon the Pathology and Treatment of Diseases of the Ear, but which we have not yet seen. This is the only book upon the subject which has issued from the Dublin press. It appeared in 1828.*

There is one English writer whom we would rescue from the criticism which has been already applied to his predecessors. In 1823, Mr. Thomas Buchanan, an intelligent surgeon of Hull, published an engraved representation of the anatomy of the human ear, to which were added some surgical remarks on Eustachian catheterism, together with an account of the operation of punctur-

* Its lengthy and attractive title runs thus: "A Treatise on Deafness; its Causes, Prevention, and Cure; the Physiology and Anatomy of the Ear; the Uses of the different parts for the modification and conveying of Sounds to the seat of Hearing; the different classes of Diseases incident to the different parts, and what class of Medicines are best calculated to restore the several parts to their proper functions; also, a representation of the cases out of the reach of human aid. The map of the internal ear will show the precise situation of the most important parts, to facilitate the study of its anatomy, and should be referred to in the perusal of this work. By T. Gardner, Esq., M. D., Aurist, and Professor of Physiology of the Ear. Dublin: Printed by J. M'Mullen, 55, Exchange-street, 1828."

ing the membrana tympani, and concluded with a synoptical table of diseases of the ear. Mr. Buchanan put forward many fallacies in his work, particularly with regard to the physiological uses and diseases of the external meatus; and in a literary point of view he seems to have fallen into the snare almost peculiar to English aurists, for within a couple of years he followed up whatever success may have attended his first publication by producing two other works, one, the "Illustrations," and the other, "The Guide to Acoustic Surgery;" and in 1828 appeared a fourth work, "Physiological Illustrations of the Organs of Hearing, more particularly of the secretion of cerumen, and its effects in rendering Auditory Perception accurate and acute." Buchanan, however, deserves our commendation and commands our respect as being the first English writer who, since the days of Saunders and Cooper, based his works upon a knowledge of the principles of anatomy and surgery; and to him we are indebted for an improvement in the inspector auris, by means of which, as I have already explained at page 12, artificial light may be transmitted through the meatus to the membrana tympani.

About the year 1820 some notices of aural diseases appeared in the medical periodicals, and foremost among the writers of these stands Mr. Henry Earle, whose short, but accurate and practical observations upon some diseases of the external meatus, published in the London Medico-Chirurgical Transactions, are well worthy of perusal. The Lancet and Medical Gazette likewise contained some detached notices, and the details and pathological appearances of several cases of the diseases of the organs of hearing.

Within the last twenty years there have appeared three small works upon the anatomy and physiology of the organ of hearing, by Mr. Swan, Mr. David Tod, and Mr. Caswall. The first of these, from the originality of its ideas, and the speculative theory of its author, justly attracted attention in an anatomico-physiological point of view, yet neither it nor the other two with which it is associated should have been enumerated in the history of aural surgery, but that to each were affixed some observations upon the pathology of the ear generally, and its congenital defects in particular. These observations are, however, crude, speculative,

and unpractical. I may merely mention one of these as a sample of the rest:—Mr. Tod proposes as a remedy for congenital deafness depending on derangement of the structures in the tympanum, the introduction of such acrid substances as ammonia, cantharides, and the mineral acids, in order to produce such an inflammation as may rouse into activity the dormant powers of the parts contained within that cavity!

The splendid discoveries of Laennec with regard to the stethoscope, and the morbid or abnormal sounds produced by streams of air passing over diseased structures, were not long in being employed as a means of diagnosis by such of his countrymen as had devoted their talents and energies to the investigation and treatment of diseases of the ear. Foremost among these stood Deleau,* whose works first established the more general practice in Europe of the introduction of various medicated vapours, as well as fluid injections, into the middle ear, by means of catheterism of the Eustachian tube, a mode of treatment since so extensively employed by Kramer. But it should not be forgotten that similar means were used in England nearly a hundred years before by Cleland and Wathan. The labours of Itard are also worthy of attention, from the clearness and perspicuity of his views, and from his vast experience in treating the inflammatory diseases of the external and middle ears, yet his work is by no means devoid of those prejudices which, even to the present day, like the amulets of a by-past age, still hang round books upon aural surgery.†

To these may be added the works of M. E. Hubert Valleroux, the chief of which is the "*Essai Theorique et Pratique sur les Maladies de l'Oreille.*" Paris: 1846.

We now turn again to Germany, where we find aural surgery in a higher condition than in any other country in Europe. To enumerate all the books and pamphlets on diseases of the ear

* "Recherches Pratique sur les Maladies de l'Oreille, et sur le Develloppement de l'Oreille et de la parole chez les Surds Muets." Paris: 1838.

† "Traite des Maladies de L'Oreille et de l'Audition." Tom. ii. Paris. Second edition, 1842.

which had emanated from the German press since 1830 would occupy unnecessary space in this limited outline, but the principal were the writings of Kramer, Lincke, Schmalz, and Frank. Dr. W. Kramer, of Berlin, published his first work, An Essay on Chronic Deafness, in 1832, and this he afterwards enlarged and published as a System of Aural Surgery in 1836, "*Die Erkenntniss und Heilung der Ohrenkrankheiten.*" In the following year it was admirably translated into English by Dr. J. R. Bennett, and is decidedly the best special treatise on the subject which has yet appeared in this country, where it exercised a most salutary influence upon the diagnosis and treatment of diseases of the ear. "In these and other signs," writes the reviewer of Dr. Bennett's translation in the British and Foreign Medical Review for 1848, "we think we see clear indications of a new era in acoustic (?) surgery in this country, when learning and science shall assert their rights, and the despicable ignorance and impudent empiricism which have hitherto prevailed shall be reduced to their proper level."* The truth of this prediction has since been verified. Dr. Kramer subsequently published two other works upon the ear,—"*Beiträge zur Ohrenheilkunde,*" in 1845, the major part of which relates to the statistics of aural diseases,—to which I shall have occasion to refer in the next chapter,—and "*Die Ohrenheilkunde in den Jahren* 1849 *und* 1850." Independent of the luminous descriptions, the critical acumen, and practical observations, and the consequent absence of quackery, with which all Dr. Kramer's writings abound, the chief newness and originality of the work, which has been translated into our language, consisted in the details of cases of nervous deafness, so called, said to have been cured by the introduction of etherous vapour and other gaseous substances, by means of an air-pump, into the middle ear, though the Eustachian tube. By thus fumigating the mucous membrane lining the drum, it was said that the dormant powers of the auditory nerve were stimulated to a healthy action! As a means of diagnosis the instrument is very

* In the admirable periodical from which the above has been extracted will be found several learned articles on aural medicine.

valuable, although the cases in which it is required are comparatively few; but as a therapeutic agent the Eustachian pump has been much overrated, and if benefit to any extent has been derived from introducing medicated vapours into the middle ear, it is more than probable that the deafness was in such cases caused by inflammation of the cavity, upon the investing membrane of which those minute ramifications of the tympanic plexus of the glosso-pharyngeal nerve are distributed, as had been previously remarked by Mr. Swan. Ten years' trial and experience has not, in other hands at least, verified the anticipations which were entertained from a perusal of the Berlinese aurist's opinions. The rage for fumigating ears, as well as eyes, has for the present passed by. It has not been found that the vapour of ether cures cases of paralysis or impairment of the function of the auditory nerves, no more than the fumes of prussic acid afford relief in amaurosis, or remove cataracts or deep-seated corneal opacities. A new and enlarged edition of Dr. Kramer's book on the Nature and Treatment of Diseases of the Ear appeared in February, 1849, the author having been, he says, induced, during the revolution in the Prussian capital, to betake himself to literature and the revision of his former writings. From the tone of the remarks which have been introduced into this new edition, one is inclined to think the writer's labours must have been very much interrupted by the fierce battle waging around him; for certainly while we are unable to discover much additional matter of value therein, we are not a little surprised at the style of his language, so uncourteous, and unsuited to a scientific subject. For myself I cannot but feel complimented by having so large a portion of the insertions in the new edition of this work devoted to the consideration and review of my writings and opinions; but for the sake of literature and science, and the friendly feeling which has so long existed between the Irish and German schools of Medicine, I cannot but regret that my friend did not discuss the questions at issue in a calmer and more philosophic mood.

Dr. C. G. Lincke, of Leipzig, has published a voluminous work upon Ear Medicine, consisting of two volumes, the first of which, upon the Anatomy, Physiology, and Pathology of the Or-

gans of Hearing, appeared in 1837; and the second, on the Nosology and Therapeutics of Diseases of the Ear, was brought out in 1840. This "*Handbuch der Theoretischen und Praktischen Ohrenheilkunde*," not having been translated into the language of this country, is not as well known as it deserves; for although it does not contain much original matter, is rather prolix in its literary analysis, and is, perhaps, somewhat too minute, not to say fanciful, in its division and enumeration of diseases of the ear, yet it comprises all that was known upon the subject of aural surgery at the time it was written, and is most valuable as a work of reference, exhibiting great learning and research.

Another industrious compiler is Dr. E. Schmalz, of Dresden, who has written several useful treatises upon this subject, and whose work upon deaf-dumbness, "*Kuze Geschichte und Statistik der Taubstummenanstalten und des Taubstummenunterrichtes nebst vorausgeschichten ärztlichen Bemerkungen über die Taubstummheit*," was one of the best when it appeared in 1830. The other principal works of this author are his "*Erfahrungen über die Krankheiten des Gehöres und ihre Heilung*," published in 1846, and "*Beiträge sur Gehör-und Sprach-Heilkunde*," in 1848.

Dr. Martell Frank, of Würtzburg, issued in 1845 his "*Practische Anleitung zur Erkenntniss und Behandlung der Ohrenkrankheiten*," &c., an admirable digest of the subject, abounding in references, but not containing much original matter. Like the works of the two former authors, it will be principally useful as a work of reference; and it abounds in wood-cuts, illustrating the different instruments used in aural surgery.

I shall now conclude this review with some notices of modern English writers. In 1837 the Medical Society of London offered a prize for the best essay on "The Structure, Economy, and Diseases of the Ear." This, together with the Fothergillian Medal, was awarded to Mr. Pilcher of London, who in the following year published his essay as "A Treatise on the Structure, Economy, and Diseases of the Ear." It is divided into three parts: the Anatomy and Physiology, the Abnormal Conditions and Malformations, and the Diseases; the latter consisting of 171 pages; a truly practical work, divested of all those absurdities which,

with the exception of those of Saunders and Buchanan, characterized its predecessors in the British metropolis. The profession would, I am sure, in the subsequent editions of this work, rather see the author's opinions supported, and his descriptions illustrated, by cases occurring under his own observation, of which he must have many, than those supplied by his friends, or extracted from periodicals. If Kramer led the profession to expect too much from the use of the air-pump, and the introduction of medicated vapour, I cannot but think Mr. Pilcher's practice of washing out the middle ear by means of a syringe attached to a catheter passed through the Eustachian tube is, to say the least of it, unnecessary; and his method of exploring that passage and the tympanum, by introducing whalebone sounds and silver stylettes, is rather heroic. The author says: "The surgeon must be specially careful not to injure the ossicula, the avoidance of which will require great caution, passing as they do across the cavity; the stylette must, therefore, *just* reach the tympanum, without entering it;" but we are not informed by what *tactus eruditus* this is effected. Mr. Pilcher's treatise is illustrated in both the anatomical and pathological departments; but not in accordance with the state of art in Great Britain fourteen years ago; of which the relation, size, shape, and bearing of the Eustachian tube and meatus auditorius externus, in Plate IX. fig. 1, is an example. It is very difficult to have a faithful drawing made of the appearance of the membrana tympani in disease; in fact the artist requires to be well acquainted with aural pathology before he can be perfectly successful; and therefore this defect—which has not as yet been remedied—is one of the causes which retard the progress of aural medicine. It is therefore of great importance that the appearance of the external surface of the membrana tympani, which, from its concealed position, very few persons ever see, should be well described, both in a healthy and diseased state, and all the peculiarities of the former accurately recorded. One, consequently, regrets that Mr. Pilcher did not record the ordinary appearances of this structure, as seen with a stream of well-directed sunlight upon it, when describing its anatomical relations and connexions; in one point of which latter I must

differ with him, and this point it is necessary to allude to, because it really is of practical importance to those commencing the study of aural diseases, and having, perhaps, to observe for themselves, without the benefit of clinical instruction, to know, that in the usual erect position of the human subject, the manubrium of the malleus, which is the chief object on which the eye first rests in examining the ear, is *not* "inclined a little forwards, but particularly inwards," but proceeds downwards and backwards. As it is not intended to discuss the opinions of authors at any length in the practical and descriptive portions of this work, these observations will not, I trust, be deemed inappropriate here.

In 1840 Dr. J. Williams published a "Treatise on the Ear; including its Anatomy, Physiology, and Pathology;" which was originally written as an Inaugural Dissertation at Edinburgh, and for which a gold medal was awarded the author by the Senatus Academicus of that University. It is a valuable and unassuming compilation, well "got up," and with good engravings, but it has not added much to our stock of knowledge on the subject, and is more valuable as a book of reference than a practitioner's guide or student's manual. Cooper's Surgical Dictionary, especially the seventh edition, published in 1848, also contains much curious information, and quotes many remarkable cases bearing upon aural surgery.

In the ninth Part of the Cyclopedia of Practical Surgery, published in 1841, Mr. T. Wharton Jones wrote the article, "Ear and Hearing, Diseases of." This essay was, as might be expected from the character and talents of its author, by far the best *resumé* of the subject which had appeared in British print,—highly learned, and at the same time in many respects practical. Mr. Jones commences with an introduction upon the analogy which exists between the anatomy and pathology of the organs of sight and hearing, which we should like to have found carried on, as we believe it might be, through the entire essay, the more especially as from the author's education and peculiar acquirements it is probable that it could have been done with greater advantage by him than by any other writer. He is an advocate for Eustachian catheterism and the use of vaporous injections, to a greater

extent than will, I believe, be found hereafter necessary. He has, moreover, introduced into this article the minute details and daily records of cases, occupying ten pages, which is rather an unusual proceeding in Cyclopædia writings, and more in accordance with the state of medical literature thirty years ago than at the time it was written. It would partake more of the nature of a review than a literary analysis, were I to enter upon a lengthened criticism of these cases, but their perusal will, I think, convince the reader of their inapplicability to the place where they are inserted. One case, the first recorded by the author, is worthy of note. A female complained of deafness accompanied by tinnitus, the consequence of a cold. The external auditory passages were impacted with hardened wax. On the left side the hearing distance by a watch was but two inches. Upon the wax being removed by syringing, the hearing distance was increased to "fifteen feet *four inches*"! and the tinnitus entirely removed. The membrana tympani is said to have been "opaque, and slightly yellow;" but the report does not state whether the patient could herself inflate the cavity of the drum. A solution of acetate of lead was poured into the auditory passages two or three times a day. For some days the hearing distance varied; a catheter was then introduced, and the air-douche applied. Upon the third application the air penetrated the tympanum freely, and the hearing distance was then increased to nineteen feet nine inches; but the report does not say what it was previous to the application of the douche. There are few persons who have ever experienced the stuffing and annoyance consequent upon "a cold in the head," or any swelling or irritation of the mucous membrane of the fauces, throat, and nose, who have not experienced sensations and variations in hearing similar to those recorded in the case related in the Cyclopædia of Surgery, but who have generally cured themselves by blowing the nose, sneezing, or coughing. Moreover, when wax has been a long time impacted in the auditory passage, it often presses the tympanal membrane inwards, and the patient does not quite recover the hearing, or get rid of the tinnitus, for some days after the removal of the cerumen, or until a

forced expiration presses the membrane outwards into its natural position.

During the last fourteen years Mr. Yearsley, of London, has published several works (and issued several editions of each) in connexion with diseases of the ear. The first of these was Part I. of "Contributions to Aural Surgery," consisting of the Proceedings of the meetings of the committee for managing "The Institution for curing Diseases of the Ear," to which was added a Medical Report, and also the detailed account of cases. The earliest of these tracts appeared in 1839, and the third, which is the last I have seen, in 1841. They abound in copious extracts from various authors, and in particular from the then recently translated work of Kramer. In these publications the author chiefly labours to impress upon the profession and the public the necessity of Eustachian catheterism in all diseases of the ear. In 1842 Mr. Yearsley published "A Treatise on the Enlarged Tonsil and Elongated Uvula, in connexion with Defects of Voice, Speech, and Hearing, &c.," of which several editions have since appeared. The author recommends excision of the tonsils for the cure of deafness, and we believe a great number of persons have since submitted to the operation; with what degree of success the profession in London are the best judges. Every practical physician and surgeon must be well aware that enlarged tonsils do not of necessity produce deafness; I shall, however, leave the further discussion of that subject to the work of Mr. Harvey, to be noticed presently. In 1847 there appeared by the same author, "Deafness practically illustrated, being an Exposition of *Original* Views as to the Causes and Treatment of Diseases of the Ear." These original views consisted of a reprint, with scarcely an alteration, of the three original tracts originally published, from 1838 to 1841, and a large portion of the book upon the Throat just referred to, to which were added chapters upon "Stomach Deafness;" the Statistics of Deafness; on the best means of compensating for Incurable Deafness; and on Ear Trumpets. The author's description of stomach deafness is as follows:—"The so-called nervous deafness, hitherto a stumbling-block to contempo-

rary writers, is nothing else than an injurious influence exerted on the ear by dyspeptic ailments, though commonly pronounced a disease depending primarily on the auditory nerve itself." And again:—"The first description of deafness from digestive disorder is that in which the disease is strictly confined to the stomach, no perceptible change having occurred in the organ of hearing, except functional torpor of the auditory nerve. This is best seen in acute indigestion." Obstruction of the biliary secretion, accumulation of morbid bile in the gall ducts, and chronic dyspepsia, are the other abdominal derangements supposed by the author to produce deafness, which he believes to be caused by an extension of a sub-inflammatory condition of the mucous membrane into the throat, and thence into the cavity of the ear, and even to the external meatus! To Mr. Yearsley, however, is due the credit of having first drawn the attention of the profession to the very valuable remedy of introducing a portion of moist cotton into the external meatus in cases of deafness arising from perforation of the tympanal membrane. The original communication upon this subject was published in "The Lancet" for July, 1848, and was afterwards reprinted as a tract upon "A New Mode of treating Deafness when attended by a partial or entire Loss of the Membrana Tympani, associated or not with Discharge from the Ear." This question will be again considered in the practical portion of this work devoted to Otorrhœa.

In 1844 Mr. W. Dufton, of Birmingham, published a little work, entitled "The Nature and Treatment of Deafness and Diseases of the Ear, and of the Treatment of the Deaf and Dumb." And in 1847 Dr. J. W. Moses, of St. Asaph, wrote a short "Treatise on the Human Ear, with new Views of the Physiology of the Tympanum."

Mr. W. Harvey, of London, has written some papers on Aural Surgery in the periodicals, and published a Chart of Diseases of the Ear, of which he issued, in connexion with Mr. Thomas Buchanan, of Hull,—to whose works I have already alluded at page 25,—a second edition in 1848, entitled "A New and Improved Synoptical Table of the Diseases of the Human Ear, with their Symptoms, Causes, and Treatment." Simplicity of nomen-

clature characterizes most modern medical writings, at least in Great Britain, and to this end the labours of Mr. Farr, in his various publications upon Vital Statistics have tended in no small degree. One can therefore scarcely appreciate the advantage derivable from any classification abounding in terms like the following:—akoluthiæ, dermatine, anachrosis, ptosees, kerinaditis, sunakolouthesis, derringitis, apoplanesis, laburinthitis, steresis, skleragosis, &c. &c. In 1850 Mr. Harvey published a book "On Excision of the Enlarged Tonsil, and its Consequences in cases of Deafness, with Remarks on Diseases of the Throat." In this most useful work the author has fairly established the fact that removal of the tonsils does not cure deafness, and that, independent of any risk in the operation itself, the excision of these bodies is often attended with subsequent unpleasant results to the patients. Every author who writes on any subject connected with diseases of the ear thinks it necessary to conclude his work with a chapter on deaf-dumbness, although very few modern writers have added anything to our stock of knowledge as regards the statistics, medical treatment, moral management, or pathology of that affection, because very few practitioners have any experience of such matters. The following paragraph upon this subject, from Mr. Harvey's work, is an example:—"A deaf-mute can learn to read and *speak perfectly*, without hearing a single tone; so that the only true test of a deaf-mute is his being able to converse with a stranger as well *without the aid of his eyes* as any person who hears well is daily in the habit of doing."—page 104. Now in the English and American schools, and most of those on the Continent, all attempts to make the deaf and dumb articulate have of late years been relinquished; and how the deaf-mute is able to converse with a stranger without the aid of his eyes, one is at a loss to discover. Mr. Harvey promises to translate and annotate the work of Lincke referred to at page 29, and also to afford us a book on certain rheumatic diseases of the ear.

Among the writings bearing on this subject may be mentioned the interesting work of the Rev. Dr. Kitto on "The Lost Senses—Series I. Deafness," published in 1845, in which the feelings, sensations, and impressions of the author, himself the subject, as he

states, of "the most intense deafness to which any living creature can be subjected," are graphically and feelingly described.

The labours and investigations of Mr. Toynbee have effected more for aural pathology than those of all his predecessors either in England or on the Continent. He commenced at the right end, and has travelled in the proper direction. He has brought to bear upon the subject the true principles of science, and with the assistance of the microscope,—the aid of every modern artistic appliance to assist him,—accustomed to habits of minute dissection, patient research, and careful observation,—he has accumulated a mass of facts upon the morbid anatomy of the organs of hearing that must lay the foundation for a more rational mode of treating the diseases of those parts than has heretofore been resorted to. Mr. Toynbee has already recorded the results of the dissection of the ears of about 750 persons sent to him for examination, but of which number not more than sixty or seventy were from persons the history of whose deafness was known.

Mr. Toynbee has laboured extensively, and with effect, to discover and describe the post-mortem appearances which disease has produced in the organ of hearing; and I trust he will long continue to prosecute, with the same avidity, the same honesty of purpose, and an equal amount of critical acumen, his valuable researches. Morbid anatomy, however, is one thing—pathology another. The dead subject upon the dissecting-table teaches the student not disease, but the results of disease. It avails little that the hospital pupil should have pointed out to him, in the dead-room, the violence which sudden accidents may have caused, or the ravages which slow disease has produced in the various organs or textures of the body; it matters not to what extent the microscope may exhibit the wide-spread lesion, or chemical tests disclose morbid products, unless the cases have been observed during life, and the progress of disease previously noted at the bedside. Therefore it is that the School of Vienna,—where a dozen bodies from different parts of the Great Hospital, but the histories of which are unknown, are sometimes cut up, and their post-mortem appearances displayed in the lecture-room on a morning,—may, under the able teaching of Rokitansky, Engel, and others, teach

morbid anatomy (pathology so called), but does not produce many practical physicians.

Mr. Toynbee's researches prove the position which I long ago advanced, and which from year to year I have been in the habit, not only of teaching theoretically, but practically demonstrating in my clinical lectures,—that the great majority of diseases of the ear producing deafness have their origin in inflammations of one kind or another. Every day's experience confirms me in this opinion; and the cases which I now publish will, I think, corroborate that view of the subject. Mr. Toynbee has not yet published any separate work upon the ear, but has contributed his observations on the Anatomy, Pathology, and Treatment of the Organs of Hearing to the different societies, and also to the periodicals, of London. Among the latter may be mentioned chiefly, the Philosophical and Medico-Chirurgical Transactions, from 1843 until the present date. He has also written several valuable papers in the Medical Times, Lancet, Provincial Journal, and Edinburgh Medical Journal.

Subsequent to Mr. Yearsley's recommendation, a fluid called glycerine was recommended, on account of its inevaporability,—a property which it undoubtedly possesses more than most other liquids,—as the only proper substance with which to moisten the wool or cotton introduced into the meatus in cases of perforate membrana tympani; and from being employed with effect in one set of cases, its virtues were vaunted as a cure for all, and during the last few years we hear this medicine extolled in the public newspapers, as well as the medical periodicals, as a panacea for deafness of all kinds, and arising from all causes. The virtues of glycerine were first made known to the profession through Mr. T. Wakley, who published an account of it in the Lancet in 1849. Since then glycerine has had "a run," particularly among the members of the profession not specially engaged in the treatment of aural diseases; and we may, therefore, well imagine in what a variety of cases, arising from the most opposite causes, and presenting a totally different set of symptoms, this remedy has been applied. Cases of nervous deafness of long standing, thickening and opacity of the membrana tympani, inflammation

and mucous engorgement of the cavity of the tympanum, thickening of the cuticular lining of the meatus resulting from otorrhœa, the various inflammatory affections of the ear, as well as simple impaction of the meatus with cerumen, are constantly forwarded to me by practitioners with the following note:—"We have applied the glycerine, as lately recommended for the *cure of deafness*, for some weeks past; but the patient not having experienced relief, we wish to have your opinion," &c. When the case does not turn out favourably, it is said by its supporters that the remedial agent is not pure; and when its purity has been tested and proved, then it turns out that the remedy was inapplicable to that particular case. Like all other remedies proposed for deafness, it has been misapplied, and even the original intention of its inventor lost sight of. The cases to which it is said to be most applicable are those of defective cerumen, dryness of the auditory passage, thickening of the membrana tympani, and that peculiar condition of the epithelial lining of the external conduit which results from previous otorrhœa. Deficiency of cerumen is but a symptom contingent upon other diseases; it is not of itself a disease of the ear nor a cause of deafness; and no better proof of this can be offered than that instanced by a case of defective hearing caused by accumulation of hardened wax. The patient is totally deaf, and labours under tinnitus aurium and other symptoms consequent upon such mechanical obstructions, which are well known to every practitioner. The application of a jet of warm water, properly directed, removes the hardened wax, when the hearing is instantaneously restored, nay, often considerably exalted. In a few hours the meatus becomes perfectly dry. Why then is it that the hearing remains perfect, although the cerumen has been completely washed away? Again, as to dryness and paleness of the meatus, it should be remembered that such is, with the exception of the part coated by cerumen, its natural condition. As regards thickening and opacity of the tympanal membrane, if glycerine can remove such, either by maceration, any caustic property which it may possess, or by inducing absorption, then indeed will it be found a great boon. In cases of thickening of the lining membrane of the meatus, and a dry,

scaly condition of the epithelium, upon the drying up of a muco-purulent discharge, it is of importance to restore these parts to a healthy condition by remedial agents, of which glycerine is not the best nor the only one. There are, however, cases in which benefit will be derived from preserving the meatus and external layer of the membrana tympani moist. The effect of such moisture is well known, not only to aural surgeons, but to patients themselves, who are in the habit of applying a little oil or even water upon the point of the finger to the external meatus whenever they find their hearing particularly defective; and in such cases this remedy, from its remarkable property of remaining fluid, when most other liquids evaporate, will be found useful. Such cases, however, are comparatively rare.

The substance denominated glycerine was discovered by Scheele, and was afterwards investigated by Chevreul. It is an almost inodorous, syrupy fluid, which gives a peculiar smoothness to the part on which it is rubbed, and is obtained in the making of litharge plaster, by washing that substance, and passing sulphuretted hydrogen gas through the washings to remove the lead,—afterwards filtering and evaporating. It is soluble in water and alcohol; does not dry or evaporate at the ordinary temperature, but if boiled, it partly distils and partly decomposes, acroleine being among its products,—and it is not liable to ferment. It is found in combination with most oils, except that obtained from the liver of the cod, now in such extensive use, which Wincler has ascertained does not contain it. Time, and the experience of the profession, which test all such remedies, no matter how vaunted or how popular, will, no doubt, develop the therapeutical effects of this substance in diseases of the ear, if such it possesses, beyond those which I have already stated. Its powers are already beginning to be questioned;—a book has, however, been written on the subject,—the last in connexion with diseases of the ear which has appeared in Great Britain,—and in accordance with the principles of this chapter it must be referred to.

In 1851 there appeared "Clinical Reports on the Use of Glycerine in the Treatment of certain Forms of Deafness, by T. Wakley, F. R. C. S. Edited by W. Tindal Robertson." Any

proposition to relieve so serious and so widely-spread an infirmity as deafness, emanating from a legalized practitioner, should be hailed by the profession as a benefit conferred upon science and humanity; but at the same time it behoves the propounders of such cures to show that their cases are well worthy of credence, and that their descriptions of disease, details of symptoms, diagnosis, and prognosis, are in accordance with the present state of medical science bearing upon such affections. Now, I do not think this work is in that position. For the application of glycerine the author recommends an instrument resembling a *porte-crayon*, for holding a piece of cotton saturated with the new remedy. The external meatus being washed out with tepid water, and thoroughly dried, which appears to be a necessary preliminary, we are gravely informed that the cotton "should be so fixed that in moving the instrument to and fro in the external meatus, the free passage of air should be provided for, otherwise an imperforate tympanum *might be ruptured*"!! The book contains the record of twenty-eight cases, in the majority of which the streets, but not the numbers, in which the patients lived, are given. The hearing distance before the application of the remedy is not stated, although the author has, he states, invented an instrument, which he styles a Sonometer, for the purpose of measuring the hearing distance, and which, he says, "has proved of the greatest value in practice," and "has done service to the profession." But what that value, and what that service is, beyond what may be acquired by an ordinary loud-ticking watch, is not recorded.* In reading over these cases, when we find such statements as the following, we are inclined to think that their reporter—we suppose some pupil of Mr. Wakley's—was not very conversant with either the normal or pathological appearances of the human ear:—"The tympanum of each ear was sound."—"The tympanum of each ear was perfect."—"Care having been taken to apply it to the tympanum." We suppose the reporter alluded to the membrana tympani. Again we read: "When the

* I saw a similar instrument used by Dr. Schmalz in Dresden in 1840. He claimed the invention of it, and has described it in his various writings.

ears are under the influence of glycerine."—"The meatus of each ear is exceedingly hard."—"Of a very pale colour."—"The aural passage and tympanum [*quere* middle ear] exhibited a white, polished appearance," &c. Among the cases related is that of a boy, deaf and dumb, in which the author says:—"The ears are very small." We then hear that "the ears were well *saturated* with glycerine," and the hearing distance tested, when, marvellous to relate, the boy seemed "to signify with his fingers the number of times he was called by his father." "It is evident," says the author, in concluding the report of this case, "that he received a certain amount of benefit from the glycerine." Here now is a fair case:—E. M., Dean-street, London, a deaf-mute, who is said to have derived benefit from this remedy. Let the boy be produced to the profession, and to the instructors of the deaf and dumb, and let them decide upon the amount of benefit derived from this or any other remedial agent in curing a case of true muteism. These cases, however, in which even "a certain amount of benefit" is said to have been derived from treatment of any kind by an unhappy deaf-mute, have their effect upon the public mind, as was instanced some years ago in the Turnbull cures related in Chambers's Journal, to be referred to presently.

In a second section of this book, consisting of a clinical lecture on the use of glycerine, illustrated by eleven cases, in which the remedy is most advisable, we find that four were instances of simple impaction of wax, which might have been removed in a few minutes by some warm water and a syringe. In the first portion of the work, dry cotton is the substance recommended for the application of the glycerine; in the latter section, however, at p. 64, sheep's wool is that deemed most advisable by the author. I have already alluded at p. 3 of this chapter to the old Irish remedy, which partakes more of the nature of a superstition than a therapeutic agent of a cure for deafness, in a bit of wool, taken at a particular time, and under particular circumstances, from the left fore-leg of a six years old black ram. In the metropolis of the world, during the middle of the nineteenth century, with science, philosophy, and common sense influencing the actions of mankind to the extent which at present prevails, one did not ex-

pect to find the surgeon of a London hospital recommending as a portion of the new cure for deafness, "the finest curled wool on the sheep's *head*, carefully cut with scissors, and washed in hot water," and adding, "the best wool is that procured from a *small* German sheep;" age unspecified.

I have dwelt thus long upon the present popular cure for deafness, and endeavoured to expose its fallacy, in the hope that the eyes of the profession may be opened to the inefficacy of such modes of treatment, and that our continental neighbours may not have an opportunity again of writing such critical reviews of British authors as those which formed an introduction to Dr. Kramer's book.

Well-educated surgeons and honest men have at last come forward to rescue this branch of the healing art from the hands of quacks and charlatans; and the names of those respectable gentlemen who at present practice aural surgery in Great Britain are a sufficient guarantee that the empiric and the nostrum-monger will soon be driven from the field. Yet that some of those latter still drive a thriving trade may be learned from the puffs and praises bestowed upon them in the literary periodicals of the day. In one of these, which, from our own knowledge of the honour and integrity of its editors, as well as its hitherto stern and uncompromising stand against quackery of every description, and its high reputation for honesty of purpose and substantial literary merit, we really expected better things, it was some time ago not only asserted, but endeavoured to be proved, that by dropping "an alkaloid" into the external meatus, or rubbing the surface of the membrana tympani with it, persons born deaf and dumb have been almost instantaneously cured! nay, not only is hearing restored on the moment, but the miracle (for miracle it certainly is, if true) extends to the organs of speech also, as in one case, and that too given on the faith of a medical man, and conveyed in a letter to the operator, he says, that "after repeated examinations of many of the objects under your care, previously to anything being done, I satisfied myself that they were both deaf and dumb. I have witnessed the application of your remedy to the ears, and bear testimony to them having in my presence obtained the sense

of hearing." But—miracle upon miracle—the faculty of speech to one who had never heard the sweet sounds of a human voice, follows almost as matter of course; for, adds the narrator, "and by my own tuition, in *a few minutes afterwards acquired the power of speech !*" I wonder was it broad Scotch they spoke!

The history of this affair is as follows:—In 1837 there appeared in London "A Treatise on Painful and Nervous Affections, and on a new mode of Treatment for Diseases of the Eye and Ear, by A. Turnbull, M. D." The portion devoted to the consideration of affections of the latter organ is comprised in six pages, and the treatment consisted of the application of the alkaloid veratria to the external meatus and the parts joining the auricle. "Feeling satisfied," says the author, "that I had in my possession means decidedly effective in promoting absorption through the medium of the nerves, and knowing that deafness often arose from the Eustachian tube being obstructed by enlarged tonsil glands, I applied veratria externally over these glands, and found it frequently succeed in removing their enlargement and restoring the hearing." The "electro-stimulation," as the author terms it, having been found so efficacious in removing deafness, such as has been described in the foregoing quotation, he was induced to extend its benefits to the deaf and dumb, and shortly afterwards it was announced that Dr. Turnbull had cured several deaf-mutes; and advertisements appeared in the newspapers for persons to instruct those patients cured by such means. The possessor of this valuable discovery next proceeded to Scotland, to operate upon the deaf and dumb portion of the inhabitants of that country, but his cures were questioned, and his statements rather severely criticised, in that valuable publication, Chamber's Journal, for 28th September, 1839. By some means, however, he afterwards proved his case to the satisfaction of the Editors, and then, in their publication for 8th January, 1842, No. 519, they acknowledged, in an article headed "Cures for Deafness," the injustice of their previous attack, and were equally loud in praise of the cures said to have been achieved. Several of these cures were said to have been effected upon children either in the Deaf and Dumb Institutions of Scotland, or known to some of the

principals of these establishments; and consequently the late Mr. Robert Kinniburgh, a gentleman of great truth and vast experience in the management of the deaf and dumb, addressed a letter to the Editors, proving distinctly in each individual case related that no cure was effected. This letter, of which I possess a copy, was published upon the 28th February, 1842, but it was only privately circulated.

It is always a matter of difficulty to argue on a medical subject with a non-professional person, for it is quite impossible for a man uninstructed in anatomy, physiology, medicine, and surgery, to be convinced of his error,—to form an opinion of the merits of a cure, or the causes of a failure. Such discussions with non-medical persons should be avoided as much as possible, they tend to no good, and were it not our conviction that Mr. Chambers, for whom we entertain the highest respect, had been made the dupe of Dr. Turnbull, we would not thus have alluded to the subject here. How few students, after two, or even three years' study in the preparatory and elementary courses, would be capable of estimating the value of any medical production put into their hands! and yet, "in order to ascertain in what respects Dr. Turnbull's practice differed from that which is general in the profession," we were gravely informed by the Editors of the Edinburgh Journal, that they "*studied* the most recent and approved works on aural surgery." Had the writer known anything of the structure of the parts he attempted to describe, he would have been better informed than to publish an account of an analogy between the ceruminous glands in the external meatus, and the mammary gland in the female; for in the article to which I allude he says: "Finding *cured* persons relapse in consequence of the defect of wax, Dr. Turnbull was prompted to use his ingenuity in endeavouring to discover a means of sustaining that secretion. He *reflected* that the application of the mouth of the child to its mother's breast, by removing the pressure of the atmosphere, causes the milk immediately to flow, and he conceived that a similar result might follow with respect to the wax of the ears, if he could by any means remove the pressure of the atmosphere from the *external parts*. For this purpose, he at first used a syringe with

an Indian-rubber mouth exactly fitted to the aperture of the ear," &c. Now the veriest tyro in medicine knows that it does not depend on any atmospheric pressure, but is owing to a morbid action in these follicles themselves that the ear wax is not *secreted*. But yet we read—"the plan was successful;" and the reason assigned is, because "the blood-*vessels* resumed a free circulation, and the *flow* of wax recommenced."

Again, we learn that "the clearing of the Eustachian tube, for which no means formerly existed but the *application* of medicine to the bowels, or the *dangerous* use of a catheter, was affected by Dr. Turnbull by the same simple means." Well might the friends and admirers of the Doctor employ the term *dangerous*, for the only record of any accident or ill-effect having arisen from the employment of this exceedingly simple and harmless operation occurred to Dr. Turnbull himself, two of whose patients, in the year 1839, fell victims to the operation of catheterism of the Eustachian tube, and on both of whom coroner's inquests were held. One of these, it appeared in evidence, was, almost immediately after the operation, attacked with emphysema of the throat and inflammation of the brain, of which he died in a week; and the other, a lad named Joseph Hall, aged 18, and in perfect health, "fell back in the chair apparently lifeless, and never spoke afterwards."—(Lancet, July 6, 1839.) In the first of these cases it appears most likely that the emphysema was caused by the instrument rupturing and tearing the mucous membrane; and in the second, in all probability, the death was caused by the shock or concussion given to the base of the skull by the volume of compressed air,—for where the mouth of the catheter was we know not. After this it seems the Doctor changed his hand, and finding that it was rather a "dangerous" experiment to "blow up" his patients, he determined to *suck* them as much as possible; and, in order to effect this, Mr. Chambers informs us, that by means of an air-pump, in connexion with a small glass tube, "introduced into the mouth of the patient, and applied to the orifice of the Eustachian passage," and consequently behind and above the soft palate! communication is opened between the previously rarified air in the receiver and the orifice, from which a

discharge of mucus is *soon made* into the tube, which is then withdrawn."

With one word more let us dismiss this subject of Dr. Turnbull and his reviewers;—a word worthy of consideration to those who may be induced by articles such as that to which I have alluded to submit their deaf-mute friends or relatives to useless pain and profitless experiment; and many an anxious parent—some from this country—upon the faith of the report then propagated, and relying on the truth of these cures, visited the *inventor* of the alkaloid, and several spent considerable sums of money in the vain hope of even once hearing their children articulate. That word is this—and it is the more suitable on account of the sanctimonious air assumed in the application of the means employed,—Were the miraculous cures of the Saviour, who sighed over the case of the deaf-mute, performed on cases or in diseases that art, either then or now, could have remedied?—could remedial agents, or man's interference, have raised the dead—thrown instantaneously the vigour of youth, and the health and strength of manhood, into the limbs of the cripple—given power to the paralytic—steadiness to the palsied—and calmness to the possessed; or have cooled the fevered—given, by a word, sight to the blind, speech to the dumb, and hearing to the deaf?—If, without the special interference of Providence, these individuals could have been cured, then their cases were not miracles; but if without the pale of art, or beyond the power of human means, then were they miracles, and cannot now be performed but by similar means. That, however, the age of miracles was at hand, Mr. Chambers appeared to have some idea, for, no doubt, aware of the instantaneous restoration of speech and hearing to the deaf-mute being one of the miracles assigned to Christ, he concludes by saying:—" 'Everything but trodden out of existence,' is, in one word, the fate of the individual who has been the first *Merely Human* being to cause the deaf to hear."

Having many years ago discussed this subject,* it is unneces-

* "Contributions to Aural Surgery, Part II., The Early History of Aural Surgery, with a Nosological Chart of Diseases of the Ear."—Dublin Journal of Medical Science for July, 1844.

sary to expatiate upon it further. The public should, however, be guarded from these impostures, which are from time to time offered for the cure of incurable diseases; among these, deaf-dumbness—some cases of which are now, I understand, undergoing a series of mesmeric experiments—is one of the most fruitful.

The various Cyclopædias of Medicine published in Great Britain contain articles upon aural diseases; among these, Dr. Copland's "Dictionary of Practical Medicine," Article, Ear and Hearing, Parts III. and IV., may be specially noticed, as embodying a compilation of the opinions of the best authors on the subject. T. Chevalier published in London a treatise "On the Cure of Polypi in the Meatus Auditorius Externus with Sulphate of Zinc," in 1843; I have not, however, seen the book.

With respect to the Irish manuscripts to which reference was made at p. 8, it could not be expected that works of that early date would afford much information on an art which has within the last few years only been raised to the level of surgical and medical science. Several of these manuscripts contain curious receipts for deafness, consisting chiefly of the juice of herbs, prepared according to a particular formula, and dropped into the external meatus; among which the roots and flowers of cowslip and the *red mesmir* mixed with honey, occur frequently; saffron and burdock boiled on vinegar, and roasted figs, were much employed; and eel oil was then, as it is still, a favourite popular receipt for deafness. In the Book of the O'Lees there is a chapter devoted to the consideration of diseases of the ear, but, like most of the other writings of that period, it consists chiefly of an enumeration of the "cures" in most general use for deafness.

I am not acquainted with any native American work on aural surgery; and the medical periodicals of that country have recorded but few cases of interest in connexion therewith. The only book which I know is that of Saissy, "An Essay on the Diseases of the Internal Ear, translated from the French, by Nathan R. Smith." Baltimore, 1829. The first volume of Baron Larrey's "*Clinique Chirurgicale*," containing a chapter on Lesions of the Ear, was translated by Dr. Rivinus, of Philadelphia, in 1832.

Edinburgh has not contributed much towards aural surgery. I know of but one special work on diseases of the ear which has issued from the Press of that ancient and celebrated School of Medicine since the time of Degravers, viz. "Treatise on the Accessary Organs of Hearing, comprising the Special Pathology and Treatment of their Diseases, by James Mercer, M.D.," which was written, I understand, as a probationary essay for the Fellowship of the College of Surgeons in 1840. In the Monthly Journal for March, 1848, will be found a very useful paper on the pathological sequences of acute inflammation of the fibro-mucous structure of the cavity of the tympanum, by the same author.

In the Monthly Journal of Medical Science for 1845 and 1846, Dr. A. Warden, "Aurist in Ordinary to the Queen," published papers on the Inspection of the Meatus Auditorius Externus. This gentleman fixed to the ordinary tubular speculum a prism for the purpose of polarizing light,—a totally useless addition. In 1847 he promised a work on the subject, of which the following is the advertisement, as it appeared in one of the Scotch newspapers:—"In the Press, and shortly will be published, the Nature and Treatment of Diseases of the Ear, as more fully revealed by the Prismatic Auriscope; with fifty coloured Delineations of Natural and Diseased Conditions.—'With the Prism in our hand we may now go forward as with a torch powerful enough to dispel all obscurity, and to enable and entitle us to plant the union-jack of the profession on the whole domain in the usual form of maps and delineations of disease.'—*Preface.*" Neither work nor preface ever appeared, and criticism of the dead would now be ungenerous.

While these pages are passing through the press, Mr. Harvey, of London, whose writings have been already alluded to at p. 35, has issued another work, entitled, "Rheumatism, Gout, and Neuralgia, as affecting the Head and Ear; with Remarks on some forms of Headach in connexion with Deafness." In it the author appears to be under the impression that he is entitled to originality for his views,—my answer to that will be found at pp. 225 and 267.

The literature relating to deaf-dumbness will be considered in the section bearing on that subject.

What is the legitimate aural practitioner in the present day, and how far does his art extend over disease? A practitioner in aural surgery, or, if it pleases the public to call him, an Aurist, in our day must, or at least he ought to be, a well-educated surgeon or physician, who applies the recognised principles of medicine and surgery to diseases of the organs of hearing, in the same manner as the modern ophthalmic surgeon does to diseases of the eye. We daily hear and read, and it has been reiterated from mouth to mouth, and copied from work to work, that the treatment of such affections is an opprobrium to the healing art, "*in surditate quidnam est male*," and that deafness is without the pale of human knowledge. Now notwithstanding the injudicious treatment by quacks and nostrum-mongers, the neglect of patients, and—as in many instances we know it is—the total abandonment of all treatment by the general practitioner, still, were the statistics of all diseases carefully collected, it would be found that there were among them as many curable cases of affections of the ear as there are among the severer maladies of the eye, or among diseases of the chest, the brain, the liver, or any other organ. Up to a very recent period, from well-educated medical men in this country either considering it beneath their station or acquirements to treat so insignificant an organ specially, or not finding in the direct cultivation of aural surgery a sufficient remuneration for their time and talents, this branch of the healing art remained in the state in which ophthalmic surgery was half a century ago. All this—added to the smaller share of sympathy afforded to the deaf than the blind; to impairment of hearing interfering less with man's means of subsistence, and also to the great difficulty of either minutely examining during life, or of investigating after death, the morbid changes which occur in the middle and internal ear—serves to account for aural surgery and pathology not having kept pace with the other rapid improvements in medical science. Yet the well-instructed aurist of our time possesses a knowledge and a power which is not general among the profession—*of making an accurate diagnosis*, which, when given with honesty, will frequently save the patient much anxiety, unnecessary suffering, and loss of time and money.

CHAPTER II.

MEANS OF DIAGNOSIS, AND APPLICATION OF REMEDIES.

Plan of the Work.—Records of Cases.—Means of forming a Diagnosis, and mode of Examination.—Physical Signs.—Instruments and Remedies.—The Auditory Canal and Membrana Tympani.—Lamps, the various forms of.—The Speculum.—Eustachian Catheterism.—The Stethoscope.—Syringing.—The Hearing Distance.—The Throat.—The Voice.—Tinnitus.—Subjective Symptoms.—Depletion.—Leeches.—Counter-Irritation.—Galvanism and Electricity.—Mercury, &c.

HAVING in the preceding chapter offered some remarks upon the subject of Aural Surgery generally, and given a short outline of the history of the art, I will now explain the plan which I have adopted in the following chapters. At the commencement of each I have given a brief anatomical description of the parts concerned in the affections under consideration, and a concise account of their most remarkable malformations and congenital diseases; afterwards, the etiology and treatment of those diseases with which I am myself most familiar are described. I have followed that division into the diseases of the external, middle, and internal ear, because it seems to facilitate description, as well as to make the most lasting impression on the mind of the student. The work concludes with a section on deaf-dumbness, which contains the result of the inquiry set on foot under the Irish Census Commission for 1851, and which I have compressed from the official Report upon that subject.*

From 1843 to the present time I have published several essays and monographs on diseases of the ear in the Dublin Journal of Medical Science, the Dublin Quarterly Journal, and the London Medical Times.† The substance of these essays, modified by sub-

* See also the Author's paper on the Statistics of Deaf-dumbness, communicated to the British Association at Belfast, September, 1852, and published in the Journal of the Statistical Society of London, for March, 1853.

† The earliest of these essays—Upon the Causes and Treatment of Otorrhœa,—that by which the tubular speculum was first introduced in this country,—appeared in the First

sequent knowledge, and amplified by whatever improvements had been made in the art since their publication, I have reprinted in this work. Those diseases of the ear with which I am not myself acquainted I have briefly enumerated and described, and given the references for their authenticity.

In an art but just emerging from the mists of quackery, which have until recently enveloped the pathology and treatment of diseases of the ear, it is of great importance to accumulate facts, and openly, fairly, and fearlessly to state the truth, even at the expense of what is termed popular reputation. Observing in the periodicals, from time to time, records of "cures" of deafness, and aural affections, which evidently prove their authors to be unacquainted with the ordinary pathological appearances of such diseases; and moreover, seeing daily "causes of deafness" put forward in books and papers, which, according to my experience, rarely, if ever, exist; and furthermore, hearing, and having continually brought under my notice (although, curious to relate, generally by persons who are themselves incurably deaf), accounts of success in the treatment of deafness in other parts of the United Kingdom, which I do not and cannot credit;—I determined to make an accurate note of every case of disease of the ear among the patients who applied at the Hospital for twelve months in succession. I believe it to be of the greatest importance, in the present state of our knowledge, to accumulate facts, and to make the profession at large acquainted with the appearances which any deviation from the normal or healthy state presents in the ear; and I have also thought it useful to familiarize the

Series of the Dublin Medical Journal, for January, 1844, vol. xxiv. p. 318, as Part i. of "Contributions to Aural Surgery." This Essay, which met with a very favourable reception on the Continent, was translated into German, and published separately by Dr. Von Haselberg, of Stralsund, in 1846, and afterwards large portions of it were translated by Dr. Schmalz, of Dresden, in 1848. Part ii.—Upon the Early History of Aural Surgery, with a Nosological Chart of Diseases of the Ear, already referred to at page 47—was published in the same periodical for May, 1844. Part iii.—On the Inflammatory Affections of the Membrana Tympani and Middle Ear—was printed in the Dublin Quarterly Journal of Medical Science, No. viii., for November, 1847, and No. xi., for February, 1848. The Practical Observations on Diseases of the Ear, with the records of cases alluded to in the text, were commenced in the Medical Times for March 29th, 1851, and have been continued until the present time.

pupils attending the Institution over which I am placed with those methods of examination which will best enable them to form an accurate diagnosis and prognosis.

Each case, as it presented, was accurately investigated in the presence of a class of advanced students and young medical men; the most prominent symptoms were noticed, the pathological condition of the parts demonstrated, and a few remarks made upon the cause of the disease, its prognosis, and treatment. Occasionally the students, under my direction, conducted the examination. A short-hand writer, familiar with medical terms, who was always in attendance, recorded with accuracy what passed. These notes, when reduced to writing, I myself corrected, and frequently compared with the appearances presented upon the patient's next attendance. By this means a vast amount of time and labour was saved, and the diseases being thus noted by myself, without the usual intervention of a "case-taker," I believe them to be more accurate than those usually related in medical writings. By this means a vast amount of information was collected. In most of these clinical cases a running comment is, as might be expected, mixed up with the description,—a more colloquial, but perhaps not less useful, form of instruction than that commonly met with in medical books and periodicals.

As far as progress and the effects of treatment are concerned, many of these cases are very defective, because, in a large public Institution, as every one knows who is extensively engaged in treating the poor, it is not possible to follow out their history. Several of the persons applying for relief, having little hope held out of ultimate restoration to perfect hearing, do not return a second time; others are kept away by their respective avocations; and many of them, having changed their residence, have found it inconvenient to attend. Unsatisfactory as these drawbacks are, and must always be under the like circumstances, I think the publication of an abstract of these cases will be so far useful, by enabling the profession to judge from what causes deafness most usually arises, and what morbid appearances most commonly present. Some of these cases, exhibiting types of disease, have already appeared in the "Medical Times."

In noting these cases, in some instances the objective, and in others the subjective symptoms, have been first recorded; but the accounts which even educated people give of the history of their deafness are frequently most incongruous, and often puzzling; and the apathy and indifference with which persons in all ranks of life have allowed the insidious approaches of aural disease to creep upon them are really marvellous. Mr. Saunders, with whose valuable essay upon the ear I wish the profession were better acquainted than they are, remarked upon this subject, in his own peculiar lucid manner of expressing himself, nearly half a century ago:—"A clear and distinct recital of symptoms is rarely obtained from the deaf. They are conscious of their infirmity, but very few are impressed with a notion that hearing may be impaired by a variety of causes. The approach of deafness is insidious, and often unaccompanied with pain. Few strong impressions are made on the mind of the patient, and he loses his faculty of hearing so imperceptibly, that in general his friends sooner discover his misfortune than himself."

With respect to the mode of conducting the inquiry in the Hospital cases, I may remark, that where a patient presented with a totally Incurable disease, a second note has rarely been recorded; indeed, the patient has always been discouraged attending the Institution. It is less likely to bring discredit upon the art when people are honestly told that, owing to their own neglect, or to their improper treatment, the time has passed by for affording them relief, than to allow them to continue for weeks or months in attendance, and often at a great expense of time. This observation holds good in private practice even more than in the management of institutions, or in treating the poor.

As in all diseases, so especially in aural affections, the first grand point is accuracy of diagnosis, without which all treatment must be empirical, and to arrive at which it is indispensably necessary that we should be thoroughly acquainted with the best mode of conducting an examination. For that reason, and because it is in it I find both the practitioner and student most frequently at fault, I have in the following pages dwelt at greater length and entered more minutely into that part of the subject, than is usual in works of this description.

Passing for the present the subjective symptoms, which will best appear in the words of the patient, let us inquire into the best method of forming a diagnosis from the physical signs presented. The patient being placed opposite strong, direct sun-light,—with the head inclined at such an angle that the sun's rays may fall directly through a tubular speculum upon the membrana tympani,—we first carefully observe the condition of the concha, external meatus, mastoid process, infrazygomatic region, and the space immediately below the lobe of the ear. The *auricle*, its various folds, its colour, its temperature in particular, its thickness as learned by feeling its hem or helix between the fingers, and the angle which it forms posteriorly with the cranium,—together with the position, size, shape, and colour of the *external meatus*, as seen without altering the relation of the parts,—should be specially noticed. The upper rim of the helix should then be grasped between the finger and thumb of one hand, and drawn upwards, backwards, and outwards, while the thumb of the other hand, placed in front of the tragus, by drawing it and the integuments forward upon the zygoma, exposes the outer third or more of the auditory canal to view. This little gorget-like instrument will also be found useful in examining the external aperture. The finger should



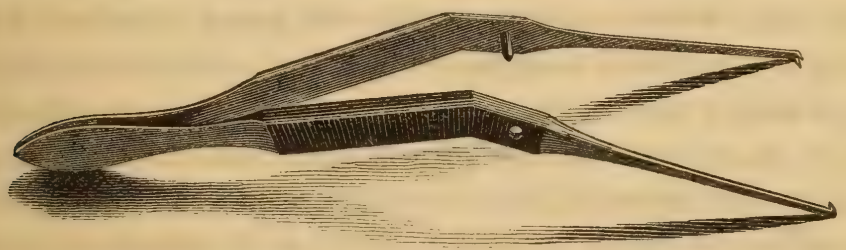
then be pressed deeply and firmly upon the moveable root of the *tragus*, and backwards into the depression between it and the articulation of the jaw. While the finger is retained in this position the patient should be desired to open and shut the mouth, and the amount of pain or inconvenience experienced by pressure in those two different positions of the jaw accurately noted. The middle and fore-fingers should likewise be inserted deeply behind the ramus of the jaw towards the styloid process, and notice taken of the sensations there experienced.

Where we have reason to believe inflammatory action exists, the *mastoid process* in an especial manner claims our attention. Its colour, size, shape, and temperature, may be learned by even a

cursory examination; but, besides this, it should be most carefully pressed upon with a couple of fingers, with a much greater degree of force and firmness than is usual in making examinations of the like nature elsewhere; and this examination should not only be applied to the mastoid region, but to the whole posterior and lateral portion of the head, if we have reason to suspect any inflammation, or its effects. The insertion of the sterno-mastoid, as well as the upper third of that muscle, should also be carefully examined in the same way, as there is a small gland, in shape and size like a horse-bean, situated immediately behind the auricle, over the middle of the mastoid process, which frequently becomes enlarged during the progress of aural inflammations, and is also the seat of violent neuralgic pain in some instances. If the integuments and soft parts are swollen or œdematous, as is frequently the case in certain inflammatory affections of the ear, as also where they have become thickened from long-continued disease, it will require a considerable degree of force to make a perfectly satisfactory examination. The amount of pitting made by the finger during this examination, and its degree of permanency, are also circumstances of value in the formation of a diagnosis. Percussion of the mastoid process, immediately behind the attachment of the auricle, occasionally affords some information, as will be shown in some of the cases hereafter detailed.

We next proceed to inquire into the condition of the *auditory canal,* and external surface of the membrana tympani. To effect this, and to explore every portion of the surface of these parts, it is necessary to resort to the mechanical assistance of the speculum; first taking care to remove any impaction of wax, accumulated discharge, or other mechanical impediment which may exist and obstruct our vision. If this obstruction is complete, and that we have reason to suppose that it is the chief cause of deafness, the employment of a syringe and some plain warm water is the best mode of removing it; but if the obstruction merely co-exists with other, and particularly with some of the inflammatory affections of the meatus or tympanal membrane, or if it be only partial, and consists of portions of detached cuticle, hairs, or scales of hardened, inspissated cerumen, it is better to remove these gently with a

pair of fine forceps, because the very act of syringing, even with warm water, causes in a healthy ear an increased vascularity, which will mask the actual amount of disease present. The same observation applies also with respect to slight otorrhœa, but if there be much discharge present, we must have recourse to the syringe. Having found that the handles of the instruments introduced through the tubular speculum and the fingers of the operator interfere to a certain degree with the direct sun-rays, I have latterly had instruments constructed with an angle in the shaft, as shown in the accompanying view of a pair of ear forceps, the utility of which is at once manifest.



Up to a very recent period we possessed no better means of examining the external meatus and the membrana tympani than that afforded by the usual ear speculum, made somewhat in the form of a crane-bill forceps, and derived, with various modifications, from the time of Fabricius Hildanus. Itard, Deleau, Verret, Robbi, Kramer, and others have improved upon this speculum, which was that in general use in this country until I introduced the tubular form in my Essay on Otorrhœa. Another description, with three arms, and opening by a screw in the form of a vagina speculum, was manufactured by Mr. Weiss, on the supposition that the external auditory passage could be increased in caliber by mechanical means, and Hoffman has published an account of a somewhat similar instrument in "*Casper's Wochenschrift*" for 1841. In making examinations of the meatus and membrana tympani with any of these instruments, the chief requisite is a *strong direct light*, transmitted without interruption to the tympanal membrane, or that portion of the passage which we wish to examine. This is best effected by means of the sun's rays, but as the ordinary speculum can only dilate or straighten the external cartilaginous portion of the passage, a person accustomed to aural examinations can

frequently, especially where the meatus is of a large size, observe the tympanal membrane, or at least a portion of it, without, as well as with, such an instrument, by merely lifting up the auricle with one hand and pressing the tragus forward with the thumb of the other. The light must, however, be strong, and made to fall directly upon the passage. In all such examinations the patient should be seated beneath the examiner, with the head slightly bent, opposite a window *through which the sun is shining* at the moment, and, if possible, between the hours of eleven and three.

Artificial light has been recommended, but it is not so requisite in this as in other countries. In Vienna, for instance, during the winter months, there are many days on which there is not sufficient sunlight for accurate aural examinations. Cleland used a convex glass, which was held before a wax candle in order to concentrate the rays of light into the meatus. To this apparatus Bozzini added a concave mirror, but without much effect; Deleau further modified it by placing a lighted taper between two concave mirrors. The invention of the instrument of this description which possesses greatest power is undoubtedly due to our countryman, Buchanan, the principle of whose lamp exhibits an evident acquaintance with the laws of light, and the mechanism of optical instruments. This was subsequently improved upon, and its effects increased by Kramer, who substituted an argand lamp for the comparatively feeble wax-light of the original inventor. This instrument, which in form, construction, and effect, very nearly resembles a common magic lantern, consists of a tin box, having its interior blackened, and being provided with a strong lamp and powerful reflector, opposite which there is a tube containing two convex lenses, each two inches and a half in diameter. In using this apparatus, a disc of strong light, about the size of a halfpenny, is thrown upon the opening of the meatus, a portion of which light is, by means of any of the ordinary specula straightening the cartilaginous portion of the tube, transmitted to the membrane of the drum. Now, independent of the inconvenience of this lamp, I may remark that, although it undoubtedly illuminates the passage and membrane very powerfully, yet the peculiar lurid glare which it throws upon

every object decidedly prevents the examiner observing with accuracy those conditions of the parts—as in inflammation, &c.—where colour and the character of the vascular arrangement forms the chief means of true diagnosis; and even Kramer himself is forced to acknowledge that "no artificial illumination can equal the light of the sun's rays, or render this light unnecessary, on which account it must always be had recourse to in important cases, e. g. in operations in the vicinity of the membrana tympani." All lamps possess these two radical defects:—One is, that although an irregularity of surface, a polypus, an aperture in the membrana tympani, or the like, may be detected, yet shades of vascularity produced by inflammation or congestion, speckled opacities, minute points of morbid deposit, and slight ulcerated abrasions, want of polish, and loss of transparency, &c., cannot be detected by their means. And again, although we were able to detect an ulcer, a granulation, or a perforation, we could not be able, while the eye is fixed upon the spot, to apply any direct remedy to the part affected,—or pass down a porte-caustic, a forceps, a snare, or a camel-hair brush. How, for instance, could a hair, no uncommon cause of annoyance, be removed off the surface of the drum but through one of these lamps? No obstetric practitioner thinks of examining the os uteri or the surface of the vagina with a lamp, so long as the sun's rays can be directed through a tubular speculum to the parts affected.

The instrument which I have here described is now generally known under the name of Kramer's ear lamp. Buchanan's apparatus is represented in his "Illustrations of Acoustic Surgery," and all the various lamps and forms of specula are figured in Lincke's *Handbuch der Ohrendheilkunde*, and in Frank's *Practische Anleitung*, page 38 to 61. In most modern English works, however, we find a copperplate of ear instruments, particularly those of Kramer, Lincke, and Schmalz, but in addition, though without much difference, we see a figure of "the author's catheter," "the author's lamp," &c. &c.

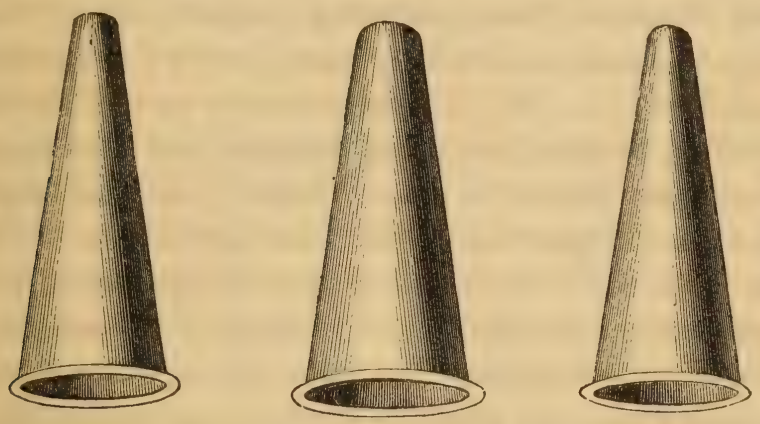
Two portable ear lamps have been produced in England within the last few years, one by Mr. Jordan of Manchester, a very ingenious instrument, and useful when artificial light is

either applicable or alone available, as at night, or in a sick-room when the patient cannot be moved to the light with facility. It consists of a small box, containing a lighted taper and two metallic reflectors, one of which is set at an angle in the bend of a projecting arm, which throws a stream of light on the membrana tympani, through a fixed tubular speculum inserted into the meatus, while the operator looks through a narrow tube containing two small lenses; but, like all such instruments, it is objectionable on account of the peculiar red glare it throws upon the parts under inspection. Mr. Averey's reflector, which is a very well-constructed instrument, is also liable to the same objection.

In 1827 Dr. Newburg, in his *Memoir et Observations sur la Perforation de la Membrane du Tympan*, published at Brussels, recommended a slender horn tube, nearly four inches long, with a bell muzzle. This instrument, which is much too long, was the origin of the different varieties of tubular specula now in use. Subsequently Dr. Gruber, of Vienna, improved upon Newburg's idea, and to him I am indebted for the instrument of which I published an account in 1844.

Having found that all the instruments heretofore invented for exploring or operating upon the external auditory passages were defective, as a means of *transmitting light*, which is the only real object of a speculum,—for it is a mistake to suppose that any apparatus can do more than straighten and dilate the *external* aperture and external third of the tube,—I have always employed the tubular speculum for this purpose. This little instrument, formed upon the principle of that invented by Dr. Newburg, and described in the preceding paragraph, I first saw used by Dr. Gruber, but employing it as he did with the artificial light of Kramer's lamp, he had not the same opportunities of testing its value and utility. These instruments consist of conical silver tubes of different calibers, such as those represented in the accompanying wood-cut, each tube or speculum being an inch and a half long, five-eighths of an inch wide at the greater aperture, and varying from two to four lines in the clear at the smaller extremity. Larger and smaller sizes will be occasionally necessary, but for the greater convenience of carrying in the pocket, I gene-

rally order a set of three, formed so as to fit into one another, and corresponding in size to the representations below. They should be made as light as possible, highly polished both inside and out, with a stout rim or burr round the larger margin, and the smaller aperture well rounded off, so as not to irritate the ear in entering.



I have tried them of various sizes and shapes, and their sides running at different angles, as well as with the interior blackened, so as to prevent reflection of the incident luminous rays, but those which I have described above I find to answer the purpose best. In using this speculum, the various sizes of which are adapted to different ages and varieties of aural aperture, the patient must, if possible, be seated opposite the light, and the head placed at such an angle as that when the instrument is introduced into the meatus, the rays of light will fall directly *through it* upon the membrana tympani. While the auricle is drawn upwards and backwards with one hand, this little tube is inserted into the meatus with the other, and is pushed in as far as possible without giving pain; the head of the patient and the tube also are then moved slightly from side to side, and the inclination or obliquity of the latter altered till a full stream of light falls upon the tympanal membrane. In making this examination the operator must be careful *to keep his own head out of the light*, the interference of which is a very frequent cause of failure with those unaccustomed to aural examinations; the shadow of the head should fall a little above or a little below the sphere of the speculum, according to the sun's elevation at the moment; and I need hardly mention that but one person can make this exploration at a time. As the tube is generally

arrested, in normal ears at least, by the narrow portion of the meatus at the junction of its middle and external thirds, we may then, by gently rotating and moving from side to side the larger aperture, which is held between the fingers, direct the stream of light so as to play upon any part in particular all round the meatus, immediately external to the membrana tympani, and by withdrawing it slightly, each portion of the passage may be thus accurately examined in detail. By this means every part of the external auditory tube, and the membrana tympani, and even the position of the malleus within it, may be as distinctly seen and as carefully examined as any portion of the external surface of the eye; whereas, with the ordinary hinge-moving speculum, I have in many cases been unable to satisfy myself as to the exact condition of the membrana tympani; and that this is daily experienced by surgeons, I have, in addition to their own acknowledgments, the fact of cases constantly presenting themselves, in which a diagnosis had been made as to the state of the membrana tympani, totally at variance with truth, and which arose from their inability to see and examine it with the usual instruments. To attempt any degree of *dilatation* of the auditory passage by means of instruments shows a want of anatomical knowledge in their inventors, as the most any speculum can effect is to straighten the external cartilaginous portion of the tube, and thereby allow the light to play upon the interior. Had the accurate and honest-minded Saunders possessed this means of examining the ear, he certainly would not have stated that he had "never observed these excrescences" (polypi and granulations) "in the meatus externus when the tympanum was sound." Another great advantage which this funnel-like speculum possesses over all others is, that it remains fixed in the ear, causing scarcely any inconvenience, and leaving one or both hands free for the application of instruments if necessary. It is also much more easily used with young children than any other.

From a long and most extensive use of the tubular speculum, I am convinced that it is not only the simplest, but also the most effectual instrument for examining the condition of the membrane of the tympanum and the external auditory canal. Various other

instruments, tubes with prisms, such as that invented by Mr. Warden, and mentioned at page 49,* and divers lamps, have been recently contrived, and their virtues set forth in graphic terms by their inventors and supporters, but they are all comparative failures, because they cannot enlarge the osseo-cartilaginous portion of the canal near the tympanum; and the prisms are totally unnecessary, and even disadvantageous, where direct light can be procured.

I have dwelt thus long upon the subject of the speculum, because without it it is impossible to form an accurate diagnosis, and because it is the want of the proper employment of this instrument which has led to such gross errors in practice. Modifications of it have been devised by others, and possibly in their hands they may be found more useful than that which I employ. I believe, however, it is a well-managed light (natural, not artificial light), a practised eye, and delicate manipulation, that, more than any peculiar form of instrument, assists the practitioner effectually to explore the external auditory passage or the middle ear, and which enables him to make an accurate diagnosis.

It is no small gratification to me, to find that my labours to make the profession in this country acquainted with the best method of examining the ear have been attended with some success. An ear speculum has now become a necessary appendage to the assortment of instruments which a surgeon usually carries about with him, while but a few years ago such a thing was unknown—in this kingdom at least. People are also beginning to find out that something may be done for deafness, and that therefore it is worth while attending to diseases of the ear in the beginning. I do not expect that the prejudices of centuries will be got rid of in a day, nor the neglect of years recovered in an hour; but I have, within the last three or four years, observed a manifest improvement in the mode of treating diseases of the ear among all classes of the profession.

The form, curvature, colour, polish, vascularity, and the se-

* See Medical Gazette for 24th May, 1844.

cretion of the entire auditory canal should be accurately noted, and having brought the whole of the passage and the entire of the membrana tympani under our view, we must take accurate note of their relative positions. In this case we suppose the external conduit free from accumulation of wax, muco-purulent discharge, or other impediment that might obstruct our view. Should, however, such exist, they must be now removed, in order that we may gain a clear, uninterrupted sight of the parts they cover. Without any abnormal secretion, however, we often meet with so much cerumen as partially interferes with the examination, and this may be gently removed with a small spatula or a probe rolled round with cotton, as by syringing in such cases we increase the vascularity, and so mask the natural appearances.

The *tympanal membrane*, in an especial manner, claims our attention; not only its superficial colour, but its degree of transparency or opacity, its tenuity or thickening, its vascularity, and the arrangement and position of its vessels in every part,—its tension, flexibility, polish, curvature, and its position as regards the interior of the cavity, of which it forms the outward boundary,—and also the direction and projection of the handle of the malleus, and the characters of the membrane, both above and below the attachment of this bone, should be carefully observed. While the membrane is thus within the field of the speculum, the patient should be desired to try and press air into the drum by holding the nose, shutting the mouth, and making a forced expiration. This manœuvre should be resorted to several times, if the first be ineffectual, as some degree of tact on the part of the patient is necessary to test the experiment. The sound thus produced is a sort of *thug*, and very much resembles that of a dried bladder suddenly inflated with air. In order to become familiar with it, one should practise it on himself. While the air is thus pressed into the drum we should note accurately whether the membrane vibrates, or its tensity is altered, and if so, whether it regains its original position suddenly or gradually. The patient's own sensations should likewise be taken into account in this matter. It is also necessary carefully to observe the degree of vascularity produced by this inflation, as well as the course and position

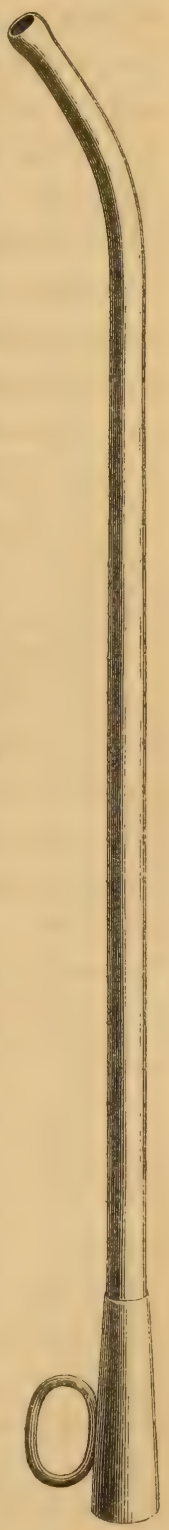
of the vessels which cause such vascularity, for even in several healthy ears, if this experiment is made two or three times, we seldom fail to recognise one or two vessels becoming filled with red blood along the course of the malleus; and if a small aperture exists in the membrane which may have previously escaped the eye, we may then readily detect it both by sight and hearing. By this means we often discover a perforation, which, from its minuteness, or owing to the part being thickened or coated with discharge, had not been noticed during the ocular inspection. If such exist, we shall then see its open, everted lips sometimes pressing out mucous discharge, and also hear a peculiar whistling sound which the air makes in passing through this narrow aperture. There are, however, some cases of perforate membrana tympani, where, from obstruction in the upper part of the Eustachian tube, or granulations in the middle ear, this cannot be effected. If the patient be able to inflate the tympanum by this method, we may then remove the speculum, and, applying our own ear, either directly or through the intervention of a stethoscope, placed over the external auditory passage, the same method of inflation should be again had recourse to, and the peculiarity of sound which is thus produced in the middle ear, whether the ordinary normal rush of air, or a prolonged squeeling or gurgling sound, such as might be caused by any contraction in or thickening of the walls of the Eustachian tube, or by dryness, or by accumulation of mucus either in it or in the cavity of the tympanum, is heard. The stethoscope should also be applied over the mastoid process, and the same series of observations made upon the sounds, if any, produced there; but these latter can seldom be heard distinctly.

If the patient be unable to inflate the tympanum, and that we have reason to suspect some obstruction of the *Eustachian tube*, or an accumulation of mucus, blood, pus, or other matter, in the middle ear, we may then, should the case require it, proceed to inject air, by the mechanical means of a pump, an elastic tube, and a catheter, into the cavity of the tympanum, while we carefully note the result by means of a stethoscope, or by the ear applied externally. It must, however, be particularly borne in

mind, that if the patient is labouring at the time under acute inflammation of the drum or its membranes, or the lining of the Eustachian tube, the catheter is not only inapplicable, but highly injurious. I have latterly found it very seldom necessary to resort to this operation, as the cases in which it is applicable are of much greater rarity than is usually supposed, or as the works of aurists would lead us to believe. Still, as exploration through the naso-tympanal passage is a valuable means of diagnosis, it should be here described. The early history of the operation has been detailed at page 11. A great variety of instruments and several ingenious machines have been invented for injecting atmospheric air, gases, medicated vapours, and fluids, into the middle ear through the Eustachian tube. These consist of catheters of different curves and calibers, and formed of flexible and inflexible materials, and a great diversity of complicated mechanical apparatus for pressing air or fluids through these, from a simple bladder or elastic bag, or a bellows, to an air-press, which compresses and condenses a certain volume of atmospheric air by means of a forcing-pump into a chamber furnished with a stop-cock, to which the catheter may be connected through the medium of a flexible tube. That devised by Kramer, and figured in his work, is by far the best and most easily managed. The pump which I am in the habit of using was manufactured for me in 1841 by Mr. Weiss, and is figured at page 70. It may not be so easily managed as that of Kramer, in which the piston rod is worked by a long lever, but it possesses the advantage of having the receiver quickly and more effectually charged. This instrument is fourteen inches high, exclusive of the piston rod, and four and a half in diameter. The cylinder of the force-pump, which rises above the surrounding receiver, and passes into it for about two-thirds of its depth, is provided with valves through which the air is accumulated in the latter to the required extent. Generally six or seven actions of the piston is sufficient for this purpose.

The catheter which I am in the habit of using with adults is that here figured of the natural size; smaller ones may be required, but a silver instrument like this, well smoothed and rounded at the

point, and of as large a size as can with facility be introduced through the nose, is less likely to do mischief, causes less irritation, is less liable to catch in the mucous membrane, and is more apt to adjust itself to the bell or trumpet-shaped mouth of the Eustachian tube, than one of a smaller size, or composed of a flexible material. Even the elastic catheter can only be introduced with a stilette, the withdrawal of which causes considerable irritation, and generally disadjusts the point of the instrument. Some people even at the present day assert that the catheter can be introduced through the mouth, and others recommend it to be passed above the lower turbinated bone of the nose. And again we hear it stated that the instrument being once fixed in the Eustachian tube, it will remain there, or the patient may be directed to hold it in that position until an inflated bladder, a bellows, a syringe, or a gum-elastic bag, charged with fluid, is attached to its extremity, and the contents discharged through it into the middle ear. It would occupy too much space to enter minutely into the objections to each of these statements or modes of proceeding. I do not believe they are generally feasible, and this is an opinion in which I am sure the most experienced aural surgeons will agree with me. Along the floor of the nose is, in the first instance, the most ready access to the Eustachian tube; but, supposing that we have passed the instrument with the greatest facility, and are quite sure that the beak has turned into its faucial opening, we must always bear in mind that not much more than half, or at most three-quarters, of an inch of the curved portion of the instrument has passed up into the tube, and that the slightest movement on the part of the patient, either of the anterior naris, which is irritated by the foreign body, or the top of the pharynx, where all the parts concerned in deglutition are more or less strained and excited, may disadjust the instrument. The



slightest effort at deglutition, even the act of swallowing the saliva, will often effect this, as we may perceive, by observing the alteration in the position of the ring at the end of the catheter which projects beyond the nose. It fortunately so happens, that nausea is seldom produced if the instrument has been carefully and delicately introduced. In order, however, to obviate the difficulties which I have just referred to, and to keep the instrument, when once properly adjusted, fixed in the right place, mechanical contrivances have been devised, of which a sort of vice—the plate of which is fastened upon the forehead, immediately above the root of the nose, by means of a leather strap furnished with a buckle, which passes round the head—is the handiest. Upon the front of the metallic plate is a ball-and-socket joint, in which revolves the little vice, or forceps, which is set on at a right angle, and should come down over the anterior opening of the nose.

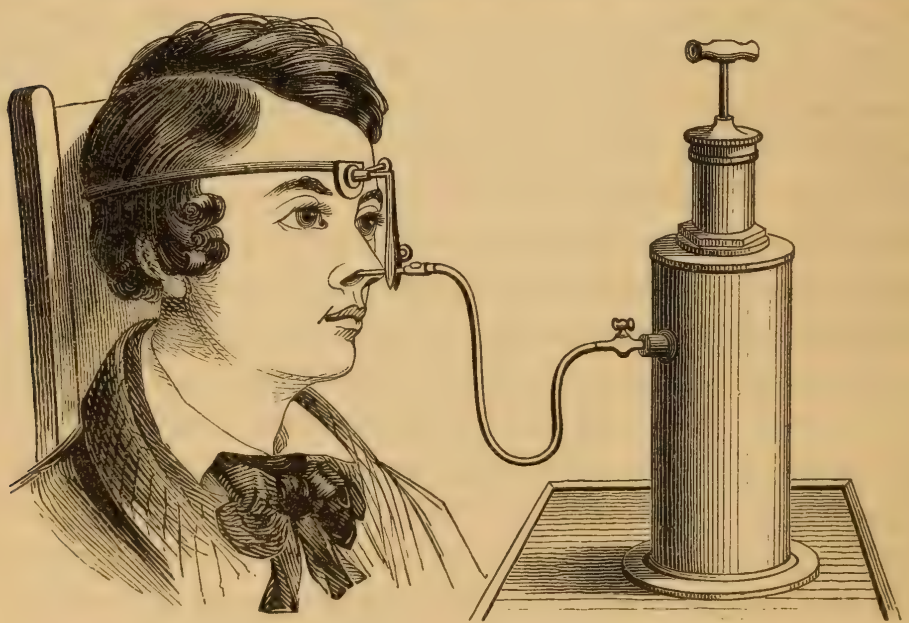
The patient being seated in a chair with the head supported against a high back, specially constructed for the purpose, and the frontlet put on as I have described,—with the fore-finger of the left hand elevate the point of the nose, and then with the right hand insert the catheter, with its beak turned outward into the angle between the floor and external wall of that cavity; passing it rapidly over the floor of the nose, a dexterous and well-practised operator will frequently hitch it into the sulcus of the Eustachian opening at the first attempt, and is conscious of the fact by that *tactus eruditus* which nothing but extensive experience can give, but which it is very difficult to describe. We can often feel the catheter grasped by the mouth of the Eustachian tube. If, however, we have missed the aperture, we must push on the catheter until it is arrested by the back of the pharynx; then turn the beak downwards, and withdraw the instrument a little, until its concavity hitches against the edge of the hard palate, and then, again making a slight sweep, and turning the beak outwards and a little upwards, and at the same time pushing it slightly in and out, and thus feeling for the opening, we will, after a little practice, succeed in our attempt. We must, however, remember that we have to deal with parts which vary in length and caliber in different individuals. We may always be aware of

the direction of the beak by looking to the ring at the end of the catheter, as they are both on the same plane. We may now be conscious that the instrument has acquired the desired position, and that its beak is in the pharyngeal extremity of the Eustachian tube; but yet, until we make a further experiment with a jet of air, we are not *perfectly certain* that it is in the exact position which we desire, as the open extremity of the instrument may be pressing against the thickened or flaccid mucous membrane of the part. Now let us suppose that the instrument has gone in with facility, that the patient is steady, and has a well formed nose, and has not expressed any sign of uneasiness,—we must not, however, let him speak, for the very act of so doing might, until the instrument is properly fixed, disadjust its point.

There is much variety in the nasal organ, and in a great number of instances the septum is not in the middle line: I have met cases in which the vomer leaned over to one side, generally the left, so that the aperture was too narrow for the passage of the instrument; and in other cases the lower spongy bone came down so low, and encroached so much upon the nasal cavity, that a similar obstruction was produced. The chief point of irritation is at the anterior extremity of the nose, and therefore it is, that we must press up its point with the finger of the left hand, and also pass the instrument with rapidity over this portion of its transit. If the operation be properly conducted, it is, though an unpleasant sensation, by no means painful, and even sneezing is seldom produced; but there is another symptom which almost invariably attends the introduction of the catheter, that is, lachrymation;—we constantly see a tear flowing over the cheek; it is not the effect of pain, otherwise both eyes would weep, for it seldom or never occurs except upon the side on which we are operating, and it appears to be the effect of irritation of the mucous membrane continuous with the conjunctiva and conveyed along the course of the excretory lachrymal duct. It is usual to warm the catheter by holding it near the fire, or rubbing it briskly through the fingers; but as the parts over which it passes are always well lubricated with mucus, and do not grasp the instrument like the

urethra, I do not think it necessary to oil the catheter, as some recommend.

Having proceeded thus far, turn down the clams or forceps, and, leaving the catheter free for a moment, grasp it with the blades of the former, and screw home the nut which tightens them, and then fix the apparatus by means of the screw which arrests the motion of the ball-and-socket joint upon the forehead plate. Upon a small table in front of the patient is placed the air-press, the mechanism of which has been already explained, and which had been previously charged, and to which the elastic tube, about two feet in length, is screwed by a stop-cock communicating with the receiver. To the other extremity of the tube is fixed a small brass ferrule which fits into the end of the catheter, in connecting it with which considerable care and nicety is required.



The catheter being held between the finger and thumb of the left hand, the ferrule should be delicately but firmly inserted into it with the right. An assistant or the patient should then hold up this connecting tube, lest its weight might disadjust the catheter's point; the position of the ring at the other end of which will always show its position. This ring should point outwards and a little upwards, nearly on a line with the external meatus, but the angle which it makes with the horizon, supposing the patient to

sit in a natural, erect position, will very much depend upon the formation, and especially the length, of the external naris. The illustration upon the previous page shows the application of the apparatus, and serves to explain the foregoing description.

Before we apply the ear or the stethoscope to the patient's ear, we should partially turn the stop-cock, so as to let a little air pass through; for frequently, especially if the patient is at all nervous, the first jet of air may cause him to start, and perhaps to derange the catheter. The operator should now apply the bell'd extremity of the stethoscope over the concha, by which means its bore is almost directly over the external meatus; and having applied his ear to the other end of it, he should turn the stop-cock of the air-press with his own hand, and thereby regulate with greater precision the force and volume of the stream of compressed air which passes up. By this mode of manipulation alone am I convinced of the fact of the air passing into the cavity of the middle ear; and, until this test is applied, I do not believe that any one can say with certainty that the air has freely passed up.

In a healthy ear, with a free tube, when a stream of air is passed into the tympanum after this fashion, it impinges upon the inner wall of the membrana tympani with a peculiar *thug*, followed by a continuous rustling sound, which is very remarkable, and, once heard, is not easily forgotten. This is the natural sound, and deviations from it, caused by stricture, or obstruction of the Eustachian passage, by a diseased condition of the membrane lining the middle ear, or by collections of mucus, pus, or other fluids in that cavity, produce abnormal sounds of a squeeling, rasping, or a gurgling character, which are of value in diagnosing aural affections. These sounds may perhaps in time be reduced to some degree of order, and we should familiarize ourselves with them, so that if possible we may be able to test and appreciate their value. Laennec was well acquainted with the phenomena of these sounds, and anticipated that auscultation would become a useful adjunct in determining not merely the condition of the Eustachian tube, but also the state of the tympanum.

We should now place the patient in such a position that we may have, through the ordinary tubular speculum, a clear view of

the external surface of the membrana tympani, and we shall then perceive, that when we permit a jet of air to reach the cavity of the tympanum, it presses outwards the anterior and lower portion of the membrane,—that which is most vibratory and placed opposite the stream of air,—and also that it at the same time renders the upper and posterior part of the membrane slightly vascular.

Were we to allow too great a stream to pass through the tube, the desired object would not be effected; the current of air, not able to find entrance through the Eustachian tube, would force back and disadjust the mouth of the catheter with a loud gurgling noise like that heard when gargling the throat, and cause considerable annoyance and even pain to the patient by its regurgitation. Therefore it is that the operator should with his own hand regulate the force of the current, while at the same time he listens to its effect upon the ear.

To remove the instrument we must proceed with the same caution and delicacy with which we introduced it; first by gently separating the connecting tube from the catheter; then freeing the latter from the blades of the vice or forceps, and, having pulled it forward a short distance, the beak should be turned downward and the instrument so withdrawn.

This, then, is the operation about which we have heard so much, and from which death is said to have occurred in two instances in London, some years ago. Simple and easy of performance, however, as it now seems, I must suppose that it is occasionally performed with roughness, and even violence. I remember a few years ago seeing a dragoon officer, who laboured under mucòus accumulation of the ears, and as he was himself unable to force air into the tympanal cavity, it was deemed advisable to resort to the operation which has been just described. Accordingly, I desired an assistant to bring in the air-press, while I proceeded to arrange the other preliminaries, merely informing the patient that it was necessary to make an examination which would put him to a little inconvenience, but not cause any pain. He eyed the preparations with considerable anxiety, and at last exclaimed, "Oh! I know now what you are going to do, and I am deter-

mined not to have that thing rammed up my nose again; for the last time it was done I was put to such pain and bled so much that I fainted." We have known such things occur to rough and ignorant practitioners in their endeavours to force a catheter into the bladder, and the mention of this circumstance is, I feel, sufficient to put us on our guard; and I think I need scarcely add, that, where such force and violence as that detailed by this gentleman were employed, the original object of the operation could not have been attained.

We have all heard a great deal about catheterism of the Eustachian tube—of the marvellous and instantaneous effects attributed thereto, of the accidents which may occur, and of the difficulties which beset the operator in his endeavour to introduce an instrument into the faucial opening of the passage which leads into the middle ear. I know few subjects upon which there is more general ignorance than the value to be attached to Eustachian catheterism, or the best mode of employing it. Some writers would lead us to suppose that this operation is of use in a far greater number of aural diseases than, according to my experience, is the fact. In order to facilitate our diagnosis, they would have us explore the middle ear by the air *douche*, a jet of water, or a solid instrument, in almost every case that presents. Errors of commission are, in both medicine and surgery, I believe, of much greater injury than those of omission; and the introduction of a foreign body into the Eustachian tube, forcing a volume of cold air, or injecting a quantity of fluid, even warm water, into the cavity of the middle ear, as some recommend and say they practise, is, in nearly all cases, while inflammatory action is going forward in the parts submitted to the process, unnecessary and frequently injurious. Again, the mode in which I have heard both patients and bystanders speak of instruments—catheters of various kinds, gum-elastic, and metallic, and even solid sounds, some of the latter much larger than the bore of the aural end of the Eustachian tube even in the dry bone—being introduced into the middle ear, in order to explore that cavity, to wash out its contents, or to break up collections of mucus within it, or to dilate strictures and contractions of the tube itself, convinces me that

the desired object was not, fortunately for the sufferers, obtained. Even Kramer speaks of pushing a catgut bougie, introduced through the Eustachian tube, "between the handle of the malleus and the incus"! People are, however, beginning to find that this attempt—for I know in many cases it is only an attempt—to force solid or fluid substances into the cavity of the drum, is as ineffectual to remove deafness as the almost indiscriminate excision of the tonsils—since preserved in pickle-pots—recommended for a like purpose a few years ago, has proved to be. I have heard of cases in which the middle ear has been said to be explored by such mechanical means, even in this country, and I have been shown steel sounds manufactured for the purpose. Such instruments are, however, with the exception of the tearing and inflammation which they may cause in the nasal extremity of the tube, harmless, for they could not by any possibility, even in the dead subject, be passed through the upper end of the Eustachian tube. We should bear this rule ever in remembrance before exploring the middle ear; it is one which Sir A. Cooper observed to me many years ago, and I have ever since acted upon it:—Whenever the patient is himself able to inflate the tympanum, never use any artificial means to do so; it is unnecessary and may be injurious. Let me to this aphorism add another, to which I have already alluded, and which surgeons would do well to remember. Where there is reason to believe that the cavity of the drum is inflamed, carefully abstain from all poking with catheters, or any attempt to introduce foreign substances into that delicately-organized portion of the animal machine. As good general surgery teaches us to avoid the introduction of instruments through an inflamed urethra, or into an irritable bladder, so ought judicious aural surgery teach us to abstain from meddling in the cases to which I have alluded. The only solid instrument with which I now ever venture to explore the Eustachian passage, and that for only a short distance, is an ivory bougie, rendered flexible by having the earthy matter removed by immersion in an acid, and the point of which for an inch at least had been previously softened in water so as to resemble a piece of gelatine. A large-sized catheter should be first introduced, and the bougie passed up

through it; but stricture of the Eustachian tube is so exceedingly rare, and so difficult to recognise during life, that the surgeon is very seldom called on to practise such an operation.

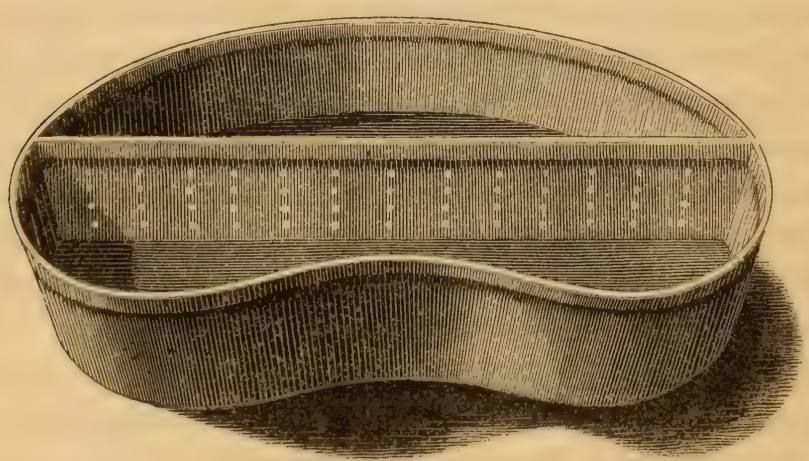
In connexion with Eustachian catheterism should be mentioned, the mode of injecting fluids for the purpose of washing out the tube and the middle ear, in case of impaction of the former, or mucous accumulation in the latter; and of introducing gases, etherous vapours, resinous and other volatile substances, for the purpose of altering the condition of the mucous membrane, or stimulating the nervous expansion on its surface. A simple elastic bag, with the nozzle adapted to the end of the catheter, will, for those who may be inclined to practise it, effect all that is required or that can be attained by syringing out the tympanum: in general I believe the fluid seldom reaches that point, while it causes great irritation by regurgitating into the throat; but in order that it may have a fair chance of going into the middle ear, the catheter ought to be fixed by the frontlet as already described. Supposing we may with safety explore the Eustachian tube, and endeavour by artificial means to press a column of air or a jet of fluid into the middle ear, and thereby free it of its extraneous contents, and restore to its natural position the vibrating portion of the tympanal membrane, it will be of little avail to effect these objects,—as it would be merely to press out the contents of the lachrymal sac in a case of mucocele, or chronic inflammation of the mucous membrane of that cavity,—unless we at the same time make use of such means, both topically and constitutionally, as shall restore the healthy character of the lining membrane, which evidently participates in the diseased action, and of which manifest traces are observable upon the external aspect of the membrana tympani.

For vaporizing the tympanum a variety of ingenious contrivances have been invented, especially by the continental aurists, consisting of air-tight jars containing gas, connected with the catheter by elastic tubes, or vessels shaped like retorts, in which the substances to be vaporized are placed, fixed upon the ordinary chemical stands over spirit-lamps. These shall be more particu-

larly considered in the section relating to "nervous deafness," the disease for which such fumigations are said to be applicable.

In the previous description of the method of examining the external and middle ear it has been presumed that the external auditory conduit is free; it may, however, and it often does, happen, that we are unable to explore the passage, or obtain a view of the membrana tympani, owing to obstruction of the former with cerumen, collections of hair, or thickened and detached epithelium, the muco-purulent secretion consequent upon otorrhœa, or foreign bodies of any description; and therefore it is sometimes necessary to have recourse to the operation of syringing merely to assist our diagnosis. Simple as this operation may appear, and frequently as it is resorted to by uneducated persons, it is one which requires some degree of tact, caution, and dexterity, in its performance.

To avoid slopping in syringing the ears, I have found the form of vessel represented below very useful: it is metallic, six inches long, four broad, and two deep; its concave part fits accurately the curve beneath the lobe of the ear, and the perforated septum strains the clean water from the dirty. If held by the patient in the proper position, closely applied to the cheek, no water can get down by its side.



The top of the auricle should be grasped with the left hand, and drawn slightly upwards, outwards, and forwards, so as to assist in straightening the auditory canal; and then we can inject

a steady stream of water, the thumb raising and depressing the piston by means of a brass syringe, capable of holding three or four ounces of fluid, but so constructed, as shown in the accompanying cut,—with a pair of loops attached to its upper extremity, through which the fore and middle fingers are passed,—that it may be worked with facility by the right hand.



This instrument is, however, only suited to the hands of a surgeon. The small pewter, bone, and glass syringes are really of little or no use. The gum-elastic bag is the safest for general use; but I do not think it possible for any one effectually to syringe his own ear.

In some persons, syringing, or the mere introduction of a speculum, induces violent paroxysms of coughing; in others, the simple act of injecting tepid water will produce syncope, although such patients tell us that it is not from the pain they feel. The removal of a granulation, or a small polypus from the external auditory passage, will at times produce sickness of stomach, weakness, and even fainting.

There is a circumstance connected with this part of the aural examination worthy of attention. We often observe that, during the removal of wax, in syringing or in any way interfering with the meatus, the patient is seized with a fit of spasmodic coughing, apparently caused by some irritation in the larynx, and we can reproduce the phenomenon simply by the introduction of a probe, and touching ever so gently a particular spot upon the surface of the meatus. This is not a very unusual phenomenon, although it cannot be produced in all cases. I never witnessed it in children or very young persons; it is most common in males of about middle life, and is in nowise connected with any previous disease existing in the respiratory apparatus. In some persons the

slightest touch of the floor of the external auditory passage, about midway between its external outlet and the inferior attachment of the membrana tympani, will bring on violent irritation and spasmodic action in the larynx. In this case also the patient will generally tell us, upon inquiry, that he does not experience pain; but that the moment we touch this very sensitive spot he feels a tickling sensation in his throat, which immediately increases to the feeling one has when "a bit is gone astray." What the nervous connexion may be which induces this has not been fully determined, but the fact is worthy of note. The different degrees of sensibility of the several parts of the external ear are worthy of remark. For further particulars on this point, and also as regards syringing, see the section on Cerumen in Chapter IV.

The effort of coughing, sneezing, blowing the nose, and deglutition, in causing or increasing pain, is also to be particularly attended to, if we suspect inflammation in the drum or the Eustachian tube.

There are two methods of examining the ear, on which, from their frequency in this country, I am induced to make some remarks, in the hope of putting a stop to practices not only useless, but in some cases positively injurious. I allude to the common habit of syringing indiscriminately, and also of probing the ears, without proper inspection of the parts. The former is of daily occurrence; thus a patient labouring under deafness, or, what perhaps is worse, violent pain in the ear, is examined either without the assistance of a speculum, or by means of some of the old divaricating instruments, most probably in a badly-lighted apartment,—at all events, without the membrana tympani being brought into view, a dark cavity being all that the explorer is able to perceive;—it is deemed advisable to try what might come out by squirting hot water into this dark passage for a quarter of an hour or longer; but, nothing satisfactory following this operation, the diagnosis that there is no wax in the ear is accordingly made. Now, there may be a collection of cerumen, which may not be got rid of by this operation; while, if the cause of the pain or deafness is owing to an inflammatory condition of the auditory canal and its membranous extremity, a decided in-

crease of the symptoms is induced by this useless and cruel proceeding: and I have frequently seen inflammation produced by unnecessarily syringing an ear where no wax was present.

The practice of exploring the ear by means of a probe I cannot too strongly condemn, and yet that it is frequently resorted to surgeons are well aware. To introduce a common dressing probe and press it against the membrana tympani, without having that membrane fairly within view, and without a speculum being introduced, but merely for the purpose of satisfying the examiner as to whether the membrane is perforate or not, is, I think, a most unjustifiable proceeding.

The *degree of deafness* may be learned, and the *hearing distance* measured, by holding an ordinary watch near the external meatus, and the distance at which the tickings can be accurately counted, and at which the patient is conscious of an interval between these sounds, should be recorded. To effect this properly, the watch should be approached gradually to the ear till it gets within the hearing point, and again applied directly to the auricle, and gradually removed to some distance. Various instruments, producing a ticking sound by means of clockwork, have been invented, by Schmalz and others, for this purpose, but the watch is quite sufficient. We should also test the hearing with the mouth open as well as shut; and it should be tried both before and after the inflation of the tympanum, as in many cases that act will produce a very material difference in the amount of hearing. The watch should next be applied both behind and in front of the auricle, and to the forehead, and also placed gently between the teeth of the patient, and the amount of hearing thus obtained likewise noted. It is absolutely necessary, if we wish to watch the progress of a case, not only to conduct these observations with great care, but also to take a written note of the "hearing distance" the first and each subsequent time we see the patient. By this means we have the most satisfactory report of the progress of the case, both for ourselves and the patient. It must be remembered that there is almost as great a difference in the normal hearing as there is in the normal seeing distance, even among persons who have never laboured under any disease of the ear, and who

are not at all conscious of any defect of hearing. The degree of hearing with a watch is sometimes deceptive; some patients who cannot hear a watch, or even a clock, will hear the voice, even in a low tone; but these are the exceptions to the rule. Except in cases of congenital or acquired deaf-dumbness, total deafness is a rare affection, much more so than total blindness; and great variety exists with respect to the amount of hearing lost, and how the defect is described, as, for instance, hardness of hearing, short hearing, dulness of hearing, &c.

While inquiring into the amount of deafness, and the circumstances under which the hearing is increased or diminished, we should learn whether it be improved or not when the patient is exposed to loud noises, as when standing in a mill, walking through a crowded street, or travelling in a carriage or on a railway. We should also inquire whether the hearing is better at one time of the day than another, and also whether it is increased or lessened after meals, particularly dinner.

The condition of the *throat*, the arches of the palate, uvula, tonsils, and back of the pharynx, should next be inquired into, particularly as regards the state of the mucous membrane, its colour, turgescence, or degree of relaxation; likewise the state of infiltration of the submucous tissue. The forefinger should then be introduced far into the mouth, and its point made to press firmly upwards and outwards beyond the arch of the palate, opposite the mouth of the Eustachian tube, and notice taken of the degree of pain or inconvenience it produces there and in the middle ear. We should also carefully examine the state of the membrane of the nose, for which purpose the little instrument figured at page 55 will be found useful.

Something may be gleaned from the character of the *voice*, as few instances occur of intense or long-continued deafness without that function exhibiting manifest symptoms of the defect of hearing to a greater or less extent. This defect does not seem to be produced by any visible alteration in the parts engaged in the mechanism of speech; it often takes place without any enlargement of the tonsils, elongation of the uvula, or other abnormal condition of the throat, larynx, or mouth. There is a peculiarity

of voice and speech attendant upon deafness approaching somewhat to the condition and character of articulation which the deaf-mute educated according to the vocal system presents, and which once heard is seldom forgotten. The voice, from not being perfectly heard by the patient himself, loses its sonorous intonation, and becomes hoarse and inharmonious, or harsh and husky, with a metallic twang. In time the patient loses the power of modulation, and often appears to labour under that defect, commonly, though incorrectly, denominated speaking through the nose. Such persons generally express themselves in an unnecessarily loud tone; they speak as if they were out of breath, and there is a sort of whistling sound in the speech as if the air was sipped in through the mouth, and then blown out through the nose; and in the advanced stage, particularly if the disease commenced in youth, the utterance becomes indistinct. Such cases are generally most unfavourable, and I make it a rule to inform the patient or his friends of my suspicions, even before I institute an examination, as this symptom is always indicative of long-continued dulness of hearing. If the patient is a person of intelligence we generally find that he anxiously and intently watches the motions of the lips of the person by whom he is addressed, in order to assist him in making out what is said. I know several persons who can understand what is addressed to them by their friends, or those to whom they are accustomed, simply by observing the motions of the lips. The works describing the mode of teaching articulation to the deaf and dumb may be read with advantage on the subject.

Persons with "musical ears" have remarked to me that they first became aware of the approach of deafness by not being able to distinguish one octave from another; yet in many instances the musical ear remains unimpaired though general hearing is much affected.

I have thus described the routine of examination that will be found most practically useful. Having proceeded thus far, we may inquire into the history of the disease, its duration, assigned cause, the pain, noise, the probable hereditary nature of the complaint, &c., and hear the subjective symptoms, in the usual manner in

which we would proceed to examine any other medical or surgical case. There are, however, a few inquiries which should be particularly made, especially as to the existence of *tinnitus aurium;* and, if such be present, what are the peculiar characters of it; how many kinds of noises are experienced; whether they are permanent or intermitting; under what circumstances they are decreased or diminished; and, above all, whether the patient refers them to the ears or to the interior of the head; and whether one or both ears are equally affected by them.

The value of tinnitus as a diagnostic has been greatly overrated. It is certainly one of the most distressing as well as the most frequent symptoms attendant upon affections of the organs of hearing, but its cause is very obscure and difficult to comprehend, and its removal still more difficult to achieve. I know no symptom concerning which a more cautious prognosis should be given, as it is one common to almost all, and peculiar to none, of the diseases of the ear. Like muscæ volitantes in the eye, it may exist as an isolated symptom, or it may be an attendant upon several aural diseases. It is often caused by cerebral disease; therefore we should carefully inquire whether it is felt in the head or in one or both ears; it is sometimes an accompaniment of derangement of the circulating, digestive, or uterine organs; of congestion of the brain, hæmorrhage, hypochondria, hysteria, chorosis, anæmia, typhus, influenza, or simple catarrh; of closure of the external meatus, obstruction of the Eustachian tube, and impaction of the auditory passage with wax; a foreign body, or even a hair resting on the tympanal membrane, as well as engorgement of the lining membrane, or mucous collections in the tympanal cavity, and also nervous deafness, will all produce it. Furthermore, we may remove the original disease, give a healthy action to the affected organ, and restore its function,—yet will the noise remain. It is always most felt at night when the patient lies down to rest; it is least experienced in the open air, in a crowd, or when travelling in a carriage. It seldom or never co-exists with an open tympanal membrane, and, therefore, perforation of the drum has been resorted to, and occasionally with effect, to relieve patients of this distressing malady. In cases of complete acquired deaf-

muteism it is not present. So great is the discomfort which it gives, that persons incurably deaf, and who are quite conscious of the impossibily of restoring their hearing, will still apply to be relieved from this haunting and most annoying symptom; and therefore it is, that, in the quack advertisements, we always read of the "promise to cure ringings and noises in the ears." The peculiar characters of the tinnitus, and the noises to which it is likened, are as variable as sound itself. Do these characters depend upon the cause of the deafness, or the portions of the organs affected? I have taken some pains to investigate the subject, and I believe not. They are no more dependent upon the causes of the disease, nor the structures engaged, than the peculiar form which ocular spectra and motes floating before the eyes are contingent upon the parts concerned in ophthalmic or cerebral diseases. No one has yet been able to arrange or classify the peculiar description of muscæ contingent upon congestion, amaurosis, choroid disease, cataract, or disease of the brain or its membranes; no more than they can satisfactorily account for both muscæ and "noises in the ears" in cases of hæmorrhage.

I think the descriptions which patients give of the noise which they experience depend, to a certain degree, upon their fancy, their graphic powers of explanation, and not unfrequently upon their rank of life, or the position in which they have been placed, and the sounds with which they are most familiar: thus, persons from the country or rural districts draw their similitudes from the objects and noises by which they have been surrounded, as the falling and rushing of water, the singing of birds, buzzing of bees, and the waving or rustling of trees; while, on the other hand, persons living in towns, or in the vicinity of machinery or manufactures, say that they hear the rolling of carriages, hammerings, and the various noises caused by steam-engines. Servants almost invariably add to their other complaints, that they suffer from "the ringing of bells" in their ears; while in this country, old women much given to tea-drinking sum up the category of their ailments by saying, that "all the kettles in Ireland are boiling in their ears." The tidal sound, or that which we can produce by

holding a conch-shell to the ear, is, however, what is most frequently complained of. Sometimes the tinnitus exists as an isolated symptom; but in several such cases I have remarked, that sooner or later either aural or cerebral disease manifested itself. Removing the cause and curing the deafness will often, but not always, relieve the patient of the noise.

The causes of tinnitus—for they must be many—are never likely to be fully explained; and morbid anatomy holds out but little hope of clearing up the mystery attending the production of noises in either the ears or head. From its not being present where the membrana tympani has been in whole or in part removed, and that hearing is not quite destroyed, and from its cessation after artificial perforation on the one hand; and, as we have all experienced its occasional presence in influenza, sore throat, or simple catarrh, until by pressing air through the Eustachian tube into the tympanal cavity, we instantaneously get rid of it,—on the other; I am firmly of opinion that one cause of tinnitus is a non-vibratability of the membrana tympani. All cases of closure of the Eustachian tube, of collapse of the membrana tympani, as well as, in most instances, of accumulations in the middle ear, are attended by this symptom. Kramer formerly thought that his so-called nervous deafness might be divided into the erethetic, or that attended with tinnitus—generally incurable—and the torpid, or that without tinnitus, said to be relieved by fumigation! He has, however, subsequently relinquished this fanciful and hypothetical division. Laennec considered tinnitus as an acoustic illusion; but buzzing in the ear might, he thought, depend on spasmodic contraction of the muscles of the ossicles. This latter theory, though unsustained by any fact, serves to support the hypothesis of the want of vibrating power in the membrana tympani being one cause of tinnitus; possibly a similar state of the membrane of the fenestra rotunda may be another.

Physicians are too much in the habit of treating patients for this symptom alone, without having made a careful examination of the ears. I have seen persons who had been subjected to a severe course of treatment, consisting of cupping and leeching, low diet, blistering the nape of the neck, purgation, salivation, or the

administration of blue pill and James's powder, for noises in the ears and head, until it was eventually discovered that all their symptoms proceeded from a comparatively thin cake of hardened wax pressing on the drum of the ear.

Inquiries as to the general health of the patient, the due performance of all the functions, and the endeavour to ascertain how much of the disease is purely local, or dependent upon some constitutional affection, will, no doubt, be made by every educated physician or surgeon, so that it is unnecessary here to call special attention to these circumstances.

By the foregoing method of examination and observation of the physical signs, and an attention to the rules which I have endeavoured to lay down, we ought in almost every case be able to form a tolerably accurate diagnosis.

As much ignorance prevails with respect to the mode of applying even the ordinary remedies employed in aural affections, a few remarks thereon may not be out of place, before entering upon a description of the cases to which they are applicable. As most of the diseases of the organs of hearing are originally of an inflammatory character, depletion is strictly enjoined; I have, however, seldom found it necessary to resort to general bleeding; but local depletion is imperatively required, either by cupping or by leeches. The former method is not easily managed so near the part affected as to be of much service; but in cases of very severe otitis, it may be had recourse to, and a dexterous cupper will with a small instrument take several ounces of blood from the soft parts immediately behind and beneath the mastoid process; and if the head be much engaged, blood may also be abstracted by the same means from the nape of the neck. Leeches are, however, the most effectual means of abstracting blood and relieving pain in all such cases; but they should not be applied in the manner heretofore employed behind the mastoid process: to be of service they must be attached with a small bevil-mouthed leech-glass immediately around and within the edge of the external meatus, in the fossa behind the tragus, and, if necessary, in front of that prominence, in the hollow formed by depressing the jaw. From four to six leeches may be readily attached round the

meatus, and in this situation they will produce more immediate and permanent relief than three times the nnmber affixed behind the auricle. The application in front of the tragus is also very much more effectual than upon the mastoid region. When, however, the latter locality becomes itself the seat of inflammatory action, they should also be applied freely all over it. Where we have already recently applied leeches in the two first-mentioned places, and that the parts have thereby become swollen and irritated, the next most advantageous position is beneath the lobe of the auricle, behind the ramus of the jaw. I do not know any painful affection in which leeches applied in the manner directed produce the same amount of immediate relief, as in disease of the ear. They should be had recourse to again and again, even upon the same day, and applied in numbers, to relieve paroxysms of pain, as well as to lessen the degree of redness and vascularity observable in the inflamed parts.

Unless in cases of violent otitis, heretofore leeches were seldom used to relieve aural diseases, because the practitioner, not being acquainted with the nature or seat of the majority of these affections, and not possessing the means or knowledge capable of effecting a proper inspection of the parts engaged, seldom made an accurate diagnosis. He worked in the dark, and prescribed at random, more frequently than when treating any other class of diseases, no matter how obscure; and hence the opprobrious epithets which the public, and even many of the profession, applied to the treatment of diseases of the ear. Such observations were, however, just as applicable to the treatment of diseases of the uterus and vagina until the introduction of the speculum into modern practice. As the space to which leeches can be applied is limited, and as it is often a tedious and troublesome operation, it requires some care and dexterity in its management. I generally mark the places where they may be applied with spots of ink, in order that the apothecary may not make any mistake; for, if this is not done, we sometimes find that the leeches have been allowed to attach themselves to the cavity of the concha, or other places on the auricle, where they are of no use, and often give rise to much irritation, œdema, and even ery-

sipelas. The external meatus should first be filled with a bit of cotton wool, to a level with the external aperture, not so much for the purpose of preventing the leeches going in too far, as to exclude the blood, which is very likely to flow back and accumulate at the bottom of the meatus auditorius externus, coagulating and crusting over the surface of the tympanal membrane, thereby causing much annoyance to the patient, and even an aggravation of his symptoms. The posterior lip of the external aperture affords the largest and most convenient surface for the application of leeches, and in an adult, three may always be attached thereto with facility. The anterior lip, being more concealed and slightly concave, cannot so well be got at, yet two may generally be applied there. The next best part to which to apply them is the depression in front of the tragus, immediately below the inferior root of the zygoma, where in aural inflammations the patient is so frequently susceptible of pain upon the least pressure, and there, six or eight may be applied if necessary.

As leech-bites on any of those places which I have mentioned continue to bleed freely for a long time, the person employed to apply the leeches should be directed to stop them as soon as the proper quantity of blood has been removed, either by the application of lunar caustic, or any of the most approved means for this purpose; but it is necessary that we should be aware of the fact, that the hæmorrhage from leech-bites on these parts is more likely to continue than elsewhere. The leech-bites do not cause extravasation and blackening of the auricle as they so frequently do the parts about the eye; but they often give rise to erysipelatous inflammation, and therefore in all such cases the idiosyncrasy of the patient in this matter should be previously inquired into. I know a gentleman with a remarkably dry skin, who labours under chronic inflammation of the membrana tympani and the mucous lining of the middle ear, who is so susceptible in this respect that the application of a single leech will invariably produce erysipelas of the side of the head and face. The cotton with which the auditory passage is stuffed, and the external portion of which always becomes saturated with the blood, should not be removed until the oozing from the leech-bites has quite ceased.

With respect to counter-irritation:—in acute cases, common fly blisters are the most convenient and effectual method; but as the space uncovered by hair over which they can be applied behind the auricle is limited, they should not have the usual adhesive margin on the inner concave edge, and they should be spread on fine leather, that they may fit closely over the irregular surface to which they are applied. If it is desirable to keep the blister open, or to establish an issue, it can easily be effected by removing the cuticle and dressing the raw surface with Albespeyrre's plaster, the most convenient spot for which is immediately behind the lobe, and beneath the mastoid protuberance. It is, however, especially in the male sex, difficult to retain such means in that locality without a bandage.

In old chronic cases, where the disease is of long standing, and there is much thickening of the membrana tympani, I have found that the pustules produced by the application of tartar emetic ointment are the most effectual method. A small quantity of the ointment should be rubbed once or twice a day to all that part of the mastoid region which is not covered by hair,—care being taken not to let the ointment spread over the back of the auricle, where it would produce very angry and irritable sores,—until a copious eruption is produced. A bit of soft linen should be applied between the auricle and the surface submitted to the action of the remedy. As soon as the pustules are fully developed the application should be discontinued, and the part allowed to heal perfectly before it is resumed. To be effectual, however, this remedy must be continued for several weeks, or even months. As it is not always possible to measure or control its action, a poultice should be applied occasionally when the pustules spread, or seem inclined to coalesce.

The usual rubefacient and vesicating liniments must be used with caution when applied to the mastoid region, as their action is very apt to spread over the back of the auricle, and cause considerable swelling and irritation thereof. I have on several occasions seen the eruption caused by croton oil extend from the mastoid region not only over the external ear, but to the side of the face, and produce œdema, redness, and intense itching of the eye-

lids. Where there is much neuralgic pain complained of, extending from the ear over the side and back of the head, I have found the compound camphor liniment, with extract of belladonna, one of the most useful applications; but in this preparation care should be taken to rub the belladonna first with a little water in a mortar, otherwise it will not mix with the liniment. In children and young persons the strong tincture of iodine, containing some iodide of potassium, is a very useful remedy, and probably acts specifically as well as a stimulant; it should be applied with a camel-hair pencil daily, or every second day, unless the parts begin to vesicate or the cuticle to peel off, when the application should be discontinued for a few days. The use of iodine, however, by the edermic method is only of value by being long persisted in. Indeed the same may be said of most irritants,—to be effective they must be continued for a great length of time, long before the expiration of which, in many cases, both the patient and the practitioner are tired of each other.

The application of heat and moisture is particularly grateful; steaming the ear by holding it over the vapour of some very hot water placed at the bottom of a long, narrow vessel, medicated with hyoscyamus, opium, belladonna, or with the ordinary decoction of marsh-mallows, camomile, or poppy-heads, gives great comfort. The Russians employ a peculiar apparatus for relieving pain in the ear, consisting of a funnel-shaped roll of linen, the small end of which is applied to the meatus, while the large end, in which various balsamic substances are placed and set fire to, is allowed to burn down slowly like a moxa. A warm linseed-meal poultice, renewed every two or three hours, gives great relief. Stupes and fomentations are not as efficacious in aural as in ophthalmic inflammations.

Under no circumstances should we pour any stimulating or sedative liquors into the ear. From the frequency of this most unjustifiable practice in this country, I feel I cannot too strongly deprecate it. If there is one substance more irritating than another in the Pharmacopœia, it is poured, *secundum artem*, into the ear, to relieve pain, or cure deafness, to lessen or to increase the secretion of wax! This practice is often the cause of myringitis.

Why are not these essential oils, stimulating liniments, this turpentine, creasote, tincture of cantharides, oil of origanum, &c., poured into the eye, or injected into the urethra, in cases of inflammation of these parts? Why do not surgeons prescribe a roasted onion, or a boiled fig, for inflammations of other parts as well as the ear?

I have no faith in either electro-magnetism, galvanism, or electricity, in relieving deafness. I never knew a case which had proved unamenable to other treatment cured by any of these means. True it is we read in the periodicals from year to year of cures effected by such agents, but for the most part they are unauthenticated, and in all, there is in the description of symptoms and the diagnosis a manifest want of knowledge on the subject of aural medicine and surgery. How would the profession receive an account of a "cure of blindness by electro-galvanism," without being informed what had been the cause of such loss of sight? However, as I believe the great mass of aural diseases are the products of inflammation in some form or other, it is obvious that such agents can effect little for their removal. Even supposing the auditory nerve to be the seat of the disease, and that a true cophosis, the analogue to amaurosis, is present, it may be asked, how few uncomplicated cases of the latter, of simple functional impairment or insensibility of the retina or optic nerve, without any cerebral lesion, do we meet with? and how still fewer do we remember being cured or relieved by electricity or galvanism? It is therefore unnecessary to describe the various ingenious machines which have been invented, and are described in books, for applying these means to the Eustachian tube, and the external surface of the tympanal membrane.

Mercury is the medicine which of all others acts most beneficially in diseases of the ears, simply on account of its specific efficacy in arresting or controlling inflammation or removing its products. But as there are a variety of aural affections to which it is applicable, so are there a variety of modes of administering this powerful mineral, and a diversity of preparations, each specially apposite to the particular stage of disease, the class of symptoms, or the peculiar habits and constitution of the patient.

A well-educated surgeon, experienced in the administration of mercury, and with general and enlarged views both as to the action of medicine and disease, will, no doubt, suit the remedy to the particular case; but as a rule I may remark, that the modes of exhibiting it in ocular affections will serve as a safe guide for giving it in diseases of the organ of hearing. In the more violent inflammations of the fibrous structure of the membrana tympani, the periosteal lining of the cavity of the tympanum, the Eustachian tube, or the deeper portion of the external meatus, and also the inflammations of the internal ear, when such can be diagnosed, as well as the specific inflammations of a rheumatic or syphilitic character, where actual ptyalism is indicated, we must introduce it quickly, and in such doses as will bring the system under its influence at once, just as we would in inflammations of analogous tissues in the eye, the envelopes of bones, or the membranes investing the joints or any of the great cavities of the body. In such cases small and frequently repeated doses of blue pill and calomel, with opium, will most speedily produce the desired effect, provided the well-known rules for the administration of mercury are attended to. I do not think, however, that students attend sufficiently to the symptoms and appearances produced by mercury on the mouth. Among the lower orders, or with hospital patients, the over-action of mercury upon his patient seldom gives the practitioner much uneasiness; but in private practice it is very different. There is a general horror of mercury among the middle and upper ranks; and the prejudices and superstitions which exist on the subject, with respect to the mischief it does to the constitution, and the difficulty of "getting it out of the bones," are still as rife among some classes as when a distinguished and titled senator swore, at the trial of St. John Long, that he saw the mercury which had been taken many years before appear in globules of pure quicksilver upon the forehead of a nobleman, drawn forth by the efficacy of the sponge and liniment of the redoubted curer of consumption! The effect of mercury upon the constitution, as well as upon disease, is most variable. With some the slightest quantity will, unless carefully watched, produce salivation; while other persons seem totally unsusceptible of its influence. The abuse,

however, which one comes in for in practice, because a patient has suddenly got a very sore mouth, should be borne with philosophic indifference; as although the effect is in excess, the desired result has been obtained. Some ladies, however, will fret about the damage likely to be done to their teeth, more than they did for the disease for which the mercury was given; and many patients, who greedily learn all the symptoms of its action, will complain of sore mouths, spongy gums, aching teeth, &c., when, in reality, it is impossible to affect them.

Few of us now witness what mercury *can* do when allowed ts full swing, or when pressed to the extent which it was some twenty or thirty years ago. Very few of us have now an opportunity, I am happy to say, of witnessing many cases of mercurial erythema, or the prostration of erythismus, or seeing every tooth in a patient's head shaking, and streams of saliva pouring from his mouth, from the long-continued use of the mineral,—when the wards of an hospital were, from the quantity of mercury used, both internally and externally, by pill-taking, skin-rubbing, plasters, and fumigation, rendered mercurial baths, in which the vapour of fetid breaths contended with the stench of sloughing ulcers, and the effluvia resulting from mercurial diarrhœa. Such times and scenes have passed, and the public and the profession have reason to rejoice thereat. Practitioners are now satisfied with the mild exhibition of mercury, and deem it more prudent to keep up a gentle action for some time than to allow profuse salivation to occur. Yet, notwithstanding all this, cases will happen the reverse of the unsusceptible, in which the mineral acts suddenly and violently, and its effects are scarcely within control. This will occur occasionally in peculiar constitutions, where there is a special idiosyncrasy. Profuse salivation rapidly sets in, the glands of the neck enlarge, the mucous membrane of the throat and inside of the mouth runs rapidly into ulceration, and the tongue swells to an alarming extent, so as to resemble a case of glossitis, but it is white, slimy, and looks like a piece of macerated liver, and it not uncommonly protrudes between the teeth. The most alarming symptoms occasionally follow, and in one instance death occurred, in this city, some years ago, from swelling

of the tongue in the manner which I described, and as the result of sudden and uncontrollable mercurial action. Sometimes the cheeks and other parts of the face swell to a great extent. It is scarcely necessary to state, that deglutition and respiration must be considerably impaired under such a state of things. Among the remarkable effects of mercury which I have seen, I may mention the instance of a lady who once consulted me on account of profuse salivation which had continued for five years.

Now it is, as I already observed, because I do not think students attend sufficiently to the appearances which mercury presents in the mouth, and also because cases of excessive mercurial action must occasionally occur in large public institutions, where it is absolutely necessary to give mercury to external patients, many of whom are either careless and indifferent about themselves, or are, from their domestic circumstances, more than ordinarily exposed to the vicissitudes of the weather, that I wish particularly to draw attention to the earlier and milder symptoms of mercurial action. The fetor of the breath is a variable sign, although when present it is an unfailing indication; but it is seldom commensurate with the amount of mercurial action. Sometimes the breath is naturally heavy, or even fetid, and then it is difficult to distinguish the one from the other. There is a peculiar heavy breath belonging to strumous patients, which it is difficult to describe, but which, once perceived, is easily recognised ever after. I may here mention, that I do not remember a single instance in which, for any cause, mercurial action was fully produced in a person possessing naturally what is termed "bad breath," that that most unpleasant affection was not removed by it. There is often some swelling of the gum behind the last molar tooth of the lower jaw; this I look upon as an almost invariable symptom, and sometimes it is the only one which can be produced. The mucous membrane between the tooth and the angle of the jaw swells and overlaps the tooth, rendering mastication very unpleasant, and giving rise to the disagreeable feeling which one experiences when cutting a wise tooth. We should always look into the mouth, as well as examine the gums beneath the front teeth, or smell the breath, where we wish to assure our-

selves as to the progress of the medicine. Another early symptom is, a slight discoloration of the mucous membrane upon the inside of the cheeks: it loses its fresh, red colour, and becomes whitish, particularly opposite the crowns of the lower teeth, the indentures of which soon manifest themselves upon it, and in a short time, if the medicine be not lessened, ulceration will ensue in that locality. One of the first places, however, where any breach of surface occurs upon the mucous membrane is immediately below the red border of the under lip, opposite the junction of the gum with the lower incisors. About the same time the tongue becomes slightly swollen, and its edge deeply indented with the lower front teeth; it is of a greyish-white colour, and covered with slimy saliva. All the glandular apparatus within the mouth is then excited to excessive action; the papillæ of the sublingual ducts become swollen and erect, and the ulcerations upon the inside of the lower lip and opposite the buccal glands upon the cheeks present the appearance of aphthous sores, greyish in the centre, with a slight straw-coloured margin; and saliva, mixed with mucus, pours from every possible outlet. As, however, these observations are not intended as a dissertation on the pharmaceutical preparations or therapeutic effects of mercury, but are here put forward in order to explain its applicability to certain diseases of the ear, it would be out of place to enter into an exposition of the means best calculated to correct its illegitimate action either upon the mouth or gastro-intestinal membrane.

In the more chronic or subacute forms of aural disease—often where the mucous membrane is extensively engaged, or when congestion, more than inflammation, is present—mercury is a valuable remedy, either as an alterative or to keep up sustained but gentle action on the mouth; and in such cases the milder preparations, such as the hydrargyrum cum creta, in combination with cicuta, will be found advantageous.

The third, and perhaps the most efficacious form, in which mercury may be used, is that of the bichloride, still commonly known in this country as the oxymuriate, one of the most valuable medicines of the entire Pharmacopœia. A treatise might be written on the virtues of this remedy, and the vast field of dis-

ease over which it exercises a sanative influence. Combined with Peruvian bark—which the chemists say is incompatible, but the product of the decomposition said to be produced by which, may be the very substance which acts most beneficially—it is almost a panacea for most of the strumous inflammations in children and young people; and its power in controlling scrofulous ophthalmia, corneitis, and iritis, &c., extends equally to the cure of kindred affections in the ear. It is the best remedy I know of for inducing absorption of lymphy deposits in the membrana tympani, and general thickening and opacity of that structure, as well as very old cases of chronic inflammation of the membrane of the cavitas tympani. It is, moreover, when properly administered, one of the safest as well as the surest preparations of mercury: it may be taken for a great length of time; it seldom interferes with the ordinary occupations or amusements of the individual; it leaves no ill effects; it rarely induces ptyalism; and patients improve in health, and absolutely grow fat while using it.* It may be given alone, either in pill or dissolved in nitrous ether, proof spirits, or some of the tinctures, such as cascarilla, but it is much more soluble in distilled water than is generally known; it may be combined with the muriated tincture of iron with good effect, or with some of the preparations of sarsaparilla; but bark—either the tincture, syrup, or decoction—is of all others the medicine best suited for its administration. Our Dublin preparation of the syrup is, particularly for children, a good vehicle for it, provided the mineral is first dissolved in a little distilled water. Oxymuriate of mercury and bark sometimes disagree, producing, shortly after being taken, pain in the stomach, tenesmus, griping, and even diarrhœa; in such cases it will generally be found that it was taken before breakfast or on an empty stomach; it should therefore be administered an hour or two after meals. But when it disagrees, even with such precautions, a separation of the constituents will obviate the unpleasant effects: thus the mercury may be taken an hour or two before or after the bark. From the sixteenth to the eighteenth, or even a quarter of a grain, may be taken three times

* I understand that the bichloride of mercury, in large doses, is used to fatten and improve the condition of horses in the West Indies.

a day, according to the circumstances of the case, for weeks and even months together, with, however, short intervals occasionally.

Deafness has been attributed to the over-use and abuse of mercury, and I was myself once under the impression that such might happen, from having seen some cases of almost complete loss of hearing in persons who, it was stated, had taken large quantities of mercury for a long time. I have recently made particular inquiry after these cases, and I have carefully examined the membrana tympani in each, and in every case I found it thickened, opaque, and manifesting all the appearances consequent upon deposits between its layers,—the result, no doubt, of specific inflammation. Each of these cases were originally syphilitic, and exhibited evident traces of a scrofulous taint, and they all acknowledged that they had taken the mercury most irregularly, and had been for years affected with secondary symptoms. I think it yet remains to be proved that mercury produces inflammation of either the eyes or ears. Practitioners of the present day have received, as by a sort of hereditary tradition, and still entertain the idea that mercury will produce iritis; and the homœopaths flourish the assertion whenever and wherever an opportunity offers, as a proof of the grand principle of their doctrine. Is it a fact that mercury taken for the cure of other diseases than those which will of themselves induce inflammation of the iris, the sclerotic, or choroid,—such as syphilis, rheumatism, gout, or scrofula,—has ever caused the train of symptoms of internal inflammation of the eye generally known as iritis?

The preparations of iodine and potassium may be employed in aural affections, and will be found efficacious just as they act on the general health or the diseases of other organs; so likewise with cod-liver oil. The only medicine I know of which appears to exercise an influence upon tinnitus aurium is leopard's bane, the arnica montana, formerly much in use for rheumatic affections, and as an external application in sprains and bruises. The value of this and other remedies in diseases of the ear, as well as their mode of administration or application, will be explained when speaking of the diseases to which they are applicable.

CHAPTER III.

STATISTICS AND NOSOLOGY OF EAR DISEASES.

Statistics of St. Mark's Hospital.—Analogy between Diseases of the Eye and Ear; Amaurosis and Nervous Deafness.—The Author's Table of 2385 Cases: their Diseases, Ages, and Sexes.—Kramer's Statistics, their Value and Peculiarities.—Tscharner's Statistics.—Toynbee's Pathological Investigations.—The Author's Abstract of 200 Cases.—Proofs of Inflammatory Action in Ear Diseases.—Nosological Arrangements of Galen, Buchanan, Harvey, Deleau, Kramer, Pilcher, Lincke, &c.—The Anatomical and Pathological Bases.—The Author's Classification.

THE subject of vital statistics has of late years engaged the attention of the scientific world more than at any former period, and within the last few years the statistics of ear diseases have been noticed by a few Continental writers. As, however, some time must elapse before an exact knowledge of aural diseases is arrived at, and until their nomenclature is fixed, such variety must exist in the accounts of different authors as to lead to apparent discrepancy, if not to a semblance of ignorance. It is not as in general medicine or surgery, where there is but little danger among educated practitioners of mistakes in registering cases of fever, pneumonia, peritonitis, or calculus ;—in diseases of the ear, what one practitioner would call nervous deafness, another might believe to be the result of some organic lesion consequent upon inflammation, &c.; and so the proportion which the different diseases bear to one another or the whole would vary according to the mode of registering, and the amount of knowledge and peculiar opinions of the registrar. As therefore statistics involve nomenclature, so does the latter subject lead us to the consideration of nosological arrangement.

The earliest and most complete statistics of ear diseases published in these Kingdoms were, I believe, those appended to the Report of St. Mark's Hospital for the year 1844–45. Since that period as accurate a registry has been kept of all the cases which presented as the means and appliances at any public

institution can afford, and the results thereof have appeared from time to time either in the Annual Reports or in the public journals. I do not think it possible to keep a sufficiently accurate account of all private patients, and therefore none such are included in these returns. From the 1st of March, 1844, to the 1st October, 1852, as shown by the accompanying Table at page 102, the number of ear patients whose diseases were registered amounted to 2385;—besides very many others of whose disease no note was taken at the time.

When I first commenced the study of aural diseases, I believed that in most cases where I had no positive evidence of disease in the meatus or membrana tympani, the deafness and tinnitus were caused by some defect in the nerve of hearing, or what is termed "nervous deafness." As, however, my field of observation extended, and as my knowledge of the healthy and morbid appearances of the membrane improved, I gradually began to find that the instances of deafness with *perfectly healthy* tympanal membranes which fell under my observation were comparatively few: while I daily became familiarized with a variety of pathological appearances in these structures, which I was soon convinced were the result of different forms of inflammation of an acute or chronic nature, arising from some idiopathic or specific cause. These appearances naturally led me to pay particular attention to those diseases in their early stages,—the only period at which, in most of them, art can be of any avail.

As the acquisition of knowledge is progressive, so my means of forming an accurate diagnosis improved with my experience, and therefore the value to be attached to the early years included in this Table is not so great as that for a later period. I have consequently divided the results into two portions: the first including three, the second four and a half, years. In the first portion of the Table, out of 706 recorded cases, 85 were set down to "nervous deafness," which I am inclined to think was an exaggeration, as by a more carefully conducted examination, and with increased experience, I found but 18 cases out of 1679 in the second period; having observed since the former period that many of the cases attributed, for want of a better name, to "nervous deafness,"

showed such manifest appearances of diseased action in the membrana tympani, that little doubt now remains upon my mind that the defect of hearing was to be attributed not to paralysis or want of power in the auditory nerves, but to lesions produced by inflammation. Again, in the first period there is no entry for thickening and opacity of the membrana tympani, the unmistakeable result of inflammation, but as many as 219 in the second; and under the head of inflammation of a chronic character, we find but 82 cases noted in the first, and 314 in the second period.

Out of the 2385 cases recorded we perceive that 579 were simply cases of impaired hearing produced by impaction of the external auditory passage with cerumen; 114 of so-called nervous deafness; 25 of tinnitus aurium, unaccompanied at the time by deafness or any apparent disease; 14 of otalgia; 7 of deaf-dumbness, either congenital or acquired; 2 of accidental hæmorrhage from the tympanal cavity; 7 of congenital malformation; 20 of collapsed membrana tympani; and 2 of tumours of the auricle:—making in all but 770 diseases of the ear not directly traceable to inflammation or its effects.

Let us reason by analogy on this great preponderance of inflammatory affections among diseases of the ear from what may be observed of the organs of sight. Out of 11,233 eye cases registered at St. Mark's Hospital, but 857 were diseases of the retina and optic nerve, and only 341 of these were instances of uncomplicated amaurosis, or about 1 in every 33 of the entire.* Whereas in the registry of ear diseases hereunto appended, the proportion of nervous deafness, including the exaggerated entry in the first period already alluded to, is about 1 in 21; but by a more accurate registry it is probable that it would bear a somewhat less proportion to the whole than amaurosis does to the general mass of diseases of the eye. In former times cases of loss of vision by what was called gutta serena, and also glaucoma, were said to be very frequent. Some time later, owing to the improved condition of ophthalmic pathology and diagnosis, observers reduced both these affections to a smaller compass under the name

* See Report on the Number and Condition of the Blind in Ireland in March, 1851, in the Report of the Census Commissioners for that period, Part II. page 45.

of amaurosis. Still more recently, and as practitioners became better acquainted with the various forms of congestion and other diseases of the choroid, and the different silent inflammations which may be set up in the eye, the latter disease was still further reduced; and now I think it will be acknowledged by those who have enjoyed extensive opportunities for studying ophthalmic affections, that true uncomplicated amaurosis, not resulting from disease of the brain or its membranes, or tumours within the cranium or the orbit, but proceeding from simple paralysis of the optic nerve or retina, are comparatively rare. When such cases are pronounced incurable at a public institution or in private practice, and are either told so honestly, or sent to the country to be got rid of, or to improve their health, broken down by disease or treatment, they are generally lost sight of; but if we examine the inmates of a blind asylum we are at once struck with the fact that nine-tenths of the cases of loss of vision there presented are the result of inflammatory action; the cases of pure unmixed amaurosis are comparatively rare, either on account of their actual scarcity, or because the patients so affected have already been carried off by the cerebral disease, which was the original cause of their blindness.

From an analysis of the following Table we perceive that diseases of the auricle and external meatus amount to nearly one-half of the entire; affections of the membrana tympani, exclusive of collapse, number 819, or nearly one-third of the entire; and diseases of the middle ear amount to 101, or about a twenty-third of the whole. The term *otitis* is here applied solely to inflammations of the cavity of the tympanum; but as it is not possible to limit inflammatory action to the peculiar structure in which it is originally set up, we may suppose that a large proportion of the diseases registered as affections of the external drum-head must have extended sooner or later to the internal surface of that membrane, and the investitures of the cavity of which it forms the outer boundary.

The subject of otorrhœa is difficult to manage, either in a statistical or a nosological point of view, owing to the variety of causes which may give rise to that affection, the different portions

of the ear from which it may proceed, its various complications, and the several structures which may be originally or subsequently engaged. The principal division made of that disease in the Statistical Table is into external, when the membrana tympani remains intact: and internal, from the circumstance of its perforation or total destruction, thereby allowing the mucous membrane of the middle ear to be exposed to the action of the atmosphere. The eleven cases of deaf-dumbness must not be taken as indicative of the real proportion which that affection bears to the other diseases of the ear; in this country the number of cases of congenital deafness applying at a public institution are always accidental. The statistics of that class are set forth in Chapter VII. Of the entire cases recorded, the sexes are in the proportion of 100 males to 79 females, these proportions, however, vary according to the different diseases: thus in eczematous and kindred affections of the auricle and meatus the females predominated, whereas among the cases of deafness arising from collections of cerumen, the male sex formed the majority. In cases attributed to nervous deafness the females predominated; whereas both in otorrhœa and all the inflammatory affections, the sexes were nearly equal; but cases of otorrhœa attended with polypus were much more frequent in the male than in the female. With respect to the relative frequency of aural diseases at particular periods of life, the following Table affords accurate information, as the ages of the different patients were carefully registered,—not the ages at which the disease appeared, but that at which the patients applied to the Institution. This Table, it must be remembered, does not include all the diseases enumerated in the Nosology, or specified in this work, as, for the purposes intended at a public institution too minute a subdivision would be disadvantageous, even were it possible, to continue it for a number of years. It is unnecessary here to enter further into its minutiæ, to discuss its results, or enlarge upon the deductions which might be drawn from it; like all such Tables it must be more or less defective; but so long as statistical calculations are admitted in medicine, it is, like others of the same class, entitled to its value.

DISEASES.	General Total.	AGES AND									
		Under 5.		6 to 10.		11 to 15.		16 to 20.		21 to 30.	
		M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Congenital Malformation of External Ear,	7	1	1	..	..	..	1	..	1	1	1
Abscess of Mastoid Gland,	2	1	..	..	..	..	..	..	..	1	..
Disease of Mastoid Process,	4	..	..	1	..	1	..	..	1	..	1
Eczema and Herpes of Auricle,	68	7	7	7	6	..	4	1	7	1	8
Tumours in ditto,	2	..	..	..	..	..	..	..	1	1	..
Inflammation of External Meatus,	25	..	..	1	1	3	1	2	..	3	5
Ditto, with Acute Otorrhœa,	12	..	1	1	2	2	1	4	1	..	..
Ditto, „ Chronic „	516	39	30	62	45	49	50	41	54	33	33
Otorrhœa, with Polypoid Growths,	64	4	2	2	2	13	8	7	4	9	3
Abscess in External Meatus,	14	..	1	..	..	1	..	2	..	2	2
Contraction and Ulceration in ditto,	6	..	..	1	..	..	1	..	..	..	1
Foreign Bodies in ditto,	2	..	..	..	..	1	..	1	..	..	..
Cerumenous Collections in ditto,	579	11	4	27	23	24	11	13	15	52	40
Inflammation of Membrana Tympani, Acute,	113	..	4	11	6	8	8	9	10	15	16
Ditto, Subacute (Strumous),	24	1	..	8	1	2	2	3	2	2	2
Ditto, Syphilitic,	3	..	..	..	..	..	..	..	..	2	..
Ditto, Chronic,	396	6	5	19	17	19	7	32	32	43	46
Abscess in Membrana Tympani,	2	..	..	1	..	..	..	..	..	..	..
Ulceration and Perforation of ditto, with Otorrhœa,	55	..	..	1	2	2	3	9	6	9	9
Thickening and Opacity of Membrana Tympani,	219	1	..	7	3	9	7	14	22	33	29
Granular and Vascular ditto,	7	..	..	..	..	..	..	..	..	1	2
Collapse of Membrana Tympani,	20	..	..	1	1	1	1	..	1	1	3
Inflammation of Cavitas Tympani (Otitis),	69	3	1	7	2	5	2	2	6	10	5
Ditto, with Caries,	5	..	..	..	..	..	2	..	1	2	..
Hæmorrhage from Tympanum,	2	..	..	..	..	..	..	1	..	..	1
Tinnitus Aurium,	25	..	..	..	..	..	..	2	3	4	8
Otalgia,	14	..	..	1	..	..	..	1	1	3	4
Nervous Deafness,	114	2	1	2	1	5	4	2	4	14	15
Post-Febrile Deafness,	3	..	..	..	..	..	..	..	..	1	..
Deaf-Dumbness,	7	1	2	1	..	2	..	1	..	..	..
Deafness from Disease of Throat,	6	..	..	1	1	1	..	..	1	..	..
TOTAL,	2385	77	59	162	113	148	113	147	173	243	234

Sexes.								Periods.		Diseases.
31 to 40.		41 to 50.		50 and Upwards.		Total.		1844 to 1847.	1847 to 1852.	
M.	F.	M.	F.	M.	F.	M.	F.			
..	..	..	..	1	..	3	4	1	6	Congenital Malformation of External Ear.
..	..	..	.	..	..	2	..	..	2	Abscess of Mastoid Gland.
..	..	..	..	..	..	2	2	2	2	Disease of Mastoid Process.
1	11	..	2	2	4	19	49	17	51	Eczema and Herpes of Auricle.
..	..	..	..	..	..	1	1	..	2	Tumours in ditto.
1	2	2	3	..	1	12	13	13	12	Inflammation of External Meatus.
..	..	..	..	..	..	7	5	3	9	Ditto, with Acute Otorrhœa.
29	11	11	8	10	11	274	242	185	331	Ditto, „ Chronic „
4	4	1	1	..	..	40	24	26	38	Otorrhœa, with Polypoid Growths.
2	2	1	1	..	..	8	6	..	14	Abscess in External Meatus.
..	..	..	2	1	..	2	4	1	5	Contraction and Ulceration in ditto.
..	..	..	..	..	..	2	..	..	2	Foreign Bodies in ditto.
37	51	85	35	86	35	365	214	160	419	Cerumenous Collections in ditto.
3	6	4	4	6	3	56	57	39	74	Inflammation of Membrana Tympani, Acute.
..	..	..	1	..	..	16	8	..	24	Ditto, Subacute (Strumous).
1	..	..	..	..	..	3	..	..	3	Ditto, Syphilitic.
31	27	34	17	20	11	234	162	82	314	Ditto, Chronic.
..	..	1	..	..	..	2	..	2	..	Abscess in Membrana Tympani.
5	3	2	2	1	1	29	26	3	52	Ulceration and Perforation of ditto, with Otorrhœa.
26	14	23	13	14	4	127	92	..	219	Thickening and Opacity of Membrana Tympani.
1	..	2	1	..	..	4	3	5	2	Granular and Vascular ditto.
2	2	1	3	1	2	7	13	10	10	Collapse of Membrana Tympani.
7	9	4	1	3	2	41	28	47	22	Inflammation of Cavitas Tympani (Otitis).
..	..	..	..	..	..	2	3	..	5	Ditto, with Caries.
..	..	..	..	..	..	1	1	1	1	Hæmorrhage from Tympanum.
1	..	2	4	..	1	9	16	14	11	Tinnitus Aurium.
1	..	2	..	1	..	9	5	4	10	Otalgia.
19	12	11	6	9	7	64	50	85	29	Nervous Deafness.
1	..	..	..	1	..	3	..	..	3	Post-Febrile Deafness.
..	..	..	..	..	..	5	2	..	7	Deaf-Dumbness.
2	..	..	..	..	..	4	2	6	..	Deafness from Disease of Throat.
34	154	186	104	156	82	1353	1032	706	1679	Total.

In 1845 Dr. Kramer published his *Beiträge zur Ohrenheilkunde*, in which he has given an extensive statistical chart and nineteen tables connected with diseases of the ear. The number of cases therein recorded amounted to 2000, of which but 5 were diseases of the auricle, and 281, or one-seventh of the whole, were diseases of the external auditory passage, including under the head of inflammation of the skin 213 cases of impactions with wax; a position which yet remains to be proved. He includes all the diseases of the tympanal membrane with those of the external ear, whereas, in my opinion, they belong equally, if not more so, to those of the middle ear: indeed, I believe that the chronic as well as the acute inflammation of the membrane is accompanied by disease in the middle ear more frequently than disease in the auditory passage. Of the 2000 cases observed, the inflammations of the tympanal membrane amounted to 442, or something less than one fourth of the whole; and of these cases, 45 were acute, and 397 chronic inflammations. 164, or about one-twelfth of the whole, were inflammations of the middle ear, but which he does not tell us were originally connected with, or subsequently produced changes in, the membrana tympani. If in these 164 cases the inflammation of the mucous membrane of the middle ear was confined to that lining the bony parietes of this cavity,—not extending over the extensive surface stretched upon the back of the membrana tympani, not propagating inflammatory action there, and producing the effects of inflammation upon transparent or diaphanous membranes,—as we see it does upon the aqueous membrane lining the back of the cornea,—then have we no analogy for such a state of things in any of the other departments of pathology. To these 164 cases of inflammation of the lining of the tympanum, he has added 30 of alterations in the Eustachian tube,—28 of stricture, and 2 of occlusion,—but for which he had no other warrant than that he was unable to pass air or solid instruments through the tube. There were 4 cases of inflammation of the periosteum of the cavity—in all, 198 diseases of the middle ear, or one-tenth of the whole. Among the diseases of the ear he has included 46 instances of deaf-dumbness. With most of these statistics we find no fault; and to the various tables exhibiting the

causes, ages, sexes, &c., we must, in common with all who will examine them, award to the zeal and industry of their author the amount of credit which they deserve. Some of these tables are, however, more curious than valuable; thus No. VIII. shows the fatherland or country of his different patients from all parts of Europe and from America!

When we come to examine into the chief cause of deafness enumerated by the Berlin aurist, we at once perceive that his favourite theory of "nervous deafness" has been pressed into the service, and this item made to exhibit a magnitude which we have strong hopes of seeing Dr. Kramer himself one day criticise with more severity than we are now willing to do for him. Of the entire number of cases recorded, 1028, or somewhat more than one-half of the whole, are set down as "*Nervöse Taubheit.*" The most that can be said of these 1028 cases, many of which may, I doubt not, have been caused by affections of the auditory nerve, is, that in these, the parts capable of inspection exhibited *to his eye* no symptoms of disease. In which case, he says, "the use of the ear catheter is the only means, either by blowing through it, or by injecting compressed air from the air-press, or by the introduction of a catgut string, or a small whalebone, or ivory probe, to learn the condition of the Eustachian tube and the cavity of the tympanum, and thereby, in the cases in question, *to judge of the condition of the auditory nerve*"! But even this hazardous mode of making an examination,—by introducing a foreign substance into the cavity of the tympanum!—is at best but a negative proof. By it the condition of the ossicula, the membrane of the fenestra rotunda, the fine mucous membrane, with its nerves, lining the tympanic cavity, the state of the labyrinth and the internal ear, or the brain, *cannot be investigated.** Is there any other organ of sense in which the affection of the nerve bears the same proportion to all the other diseases of the part as this? Would any table of the affections of the eye be acknowledged as authentic in which more than one-half of the diseases of that organ were ascribed to amaurosis, or amaurosis not consequent upon some in-

* A very admirable analysis of Kramer's Statistics appeared in the British and Foreign Medical Review for July, 1847.

flammatory condition? Let us ask what Dr. Kramer means by nervous deafness? He himself answers, in the first edition of his *Erkenntniss und Heilung der Ohrenkrankheiten*, that such cases are those in which "we find the hearing altered and debilitated without any organic abnormal state in any part of the whole organ of hearing" (see Bennett's translation, page 255). And in the paragraph following he adds, with great justice, "This nervous deafness has hitherto been frequently misused as a cloak for ignorance and want of skill in any doubtful or obscure disease of the ear." Now, all the value we derive from the foregoing definition is, as already stated, that the examination of such cases afforded negative evidence as to the existence of disease at the moment in those parts visible to the eye, or the condition of which was appreciable by the ear by means of the air-douche, &c. Sixteen years ago the author divided this nervous deafness into that attended with tinnitus, or the erethitic, which he believed to be amenable to treatment, and the torpid, in which there was a total absence of tinnitus throughout the whole course of the disease. Let us read from Dr. Bennett's faithful translation of the work just alluded to what was Dr. Kramer's exposition of the physical signs of nervous deafness in the year 1836. All traces of cerumenous secretion vanish by degrees; the Eustachian tube, as also the middle ear, is in general free and open, and a stream of air passes readily up to the tympanal membrane; and then he says, "In both forms of nervous deafness" (i.e. the torpid and erethitic) "I have almost *always found the membrana tympani white like paper, and opaque;* probably in consequence of the action of its absorbent vessels having been impaired." Now, had Dr. Kramer been conversant with the normal, healthy condition of the membrana tympani, he would have known that it was shining, diaphanous, or semi-transparent, and of a yellow-grey tint (except toward its superior attachment, and along the line of insertion of the handle of the hammer bone), somewhat the colour of gold-beater's skin, or, what bears a still closer similitude on account of its greater thickness and fleshy tint, the thin sheet gutta percha which has been lately introduced for surgical purposes.

To state, then, that a texture, the normal condition of which is

known to every observer of it in the living healthy state,* to be what I have described, is "white like paper, and opaque," exhibits either defective powers of observation, insufficient means for investigation, or a want of knowledge of the natural condition of the parts. What would be thought of an ophthalmic surgeon who, in describing a case of amaurosis, stated that all the structures were normal, but that, at the same time, the cornea was opaque, or even cloudy? Yes, I do believe that in the cases observed by Kramer, and described in his original work, the membrana tympani was opaque, like white paper, because it had been previously subjected to inflammatory action, and the opaque deposit was the well-known consequence thereof. As to his mode of accounting for the opacity by a want of action in the absorbent vessels, I do not think it requires refutation. Some of the worst cases of defective hearing, apparently induced by paralysis or impaired function of the auditory nerves, and which are of many years' standing, have perfectly normal tympanal membranes. Furthermore, if those cases attributed to nervous deafness showed such manifest disease in the external membrane of the tympanum, which *was* seen, how much greater may not have been the morbid changes in the parts beyond it, both in the middle and internal ear, which were *not* seen?

In the Statistics already alluded to, Dr. Kramer modified his former views as regards the division of nervous deafness, and classified both under the general head of diseases of the inner ear —as *nervöse Taubheit*. Again, in 1849, in the second edition of his principal work on Diseases of the Ear, he defines the affections in the chapter devoted to the consideration of nervous diseases of the inner ear as, hard-hearingness, and deafness; and without any preliminary observations, at once enters into the details of cases and observations in proof of the so-called nervous

* Anatomists seldom see the membrana tympani except in the dead state, when partial decomposition has set in, and its external cuticular layer has become thickened and opaque: therefore it is that their descriptions of this structure are not as accurate as of other parts of the human body. Suppose anatomists were to describe the cornea only from the condition it presents in subjects five or six days dead, how little would have been written about the polish, transparency, and curvature of that beautiful structure!

deafness. And in almost all the cases recorded in that section (p. 668, from No. 128 to No. 165) we read of the membrana tympani being clear, shining, and transparent, thus differing from his observations made in 1836, when the same structure was almost always white like paper, and opaque.

Mr. Toynbee's observations and dissections, having a direct influence on the statement set forth in these statistics, naturally attracted much attention, and would, unless disproved by counter facts, be a "heavy blow and a great discouragement" to Dr. Kramer's views, and, consequently, in the Medical Times and Gazette (for October 16th, 1852), the Prussian surgeon is again in print on the subject,—fearful that his English professional brethren should not fully appreciate the results of his "extensive aural practice of upwards of twenty-two years." He begs his readers to be satisfied with his pathological (?) sketch of real, not fancied diseases, in contradistinction to the researches of Mr. Toynbee. Appended to that paper is a table, *republished* from page 113 of his *Ohrenheilkundie in den Jahren* 1849 *und* 1850, giving the result of 4000 cases,—2000 additional to the statistics published in 1845,—and there again nervous diseases of the ear are made to exhibit the same proportion to the entire which they did in the previous calculations, for we find 1875 cases of nervous deafness out of the additional 2000 set down under the respective heads of "hardness of hearing," and "deafness." Time and pathological research will eventually determine the matter in dispute, but at present it will be for the practical surgeon to judge between Mr. Toynbee's *dissections*, which he still possesses, and which can be examined by any person who pleases to wait upon him,—but the inferences from which Kramer says "are of a purely theoretical character," inducing "false consequences and conclusions,"—and the figures given as the result of the latter's private practice, and set forth so ostentatiously in his various publications.

Let the profession also compare the result of the observations and brief details of *facts* set forth in the tabulated abstract of 200 cases faithfully taken as they presented at a public hospital, in the presence of, and equally observed by, a number of medical men and intelligent students, many of whom will no doubt recognise these

cases when they read them, given at the conclusion of this chapter, with the figures afforded from time to time by Dr. Kramer. Far be it from me to deny the great prevalence of what is termed nervous deafness; in the foregoing observations I merely doubt the proportion which, according to the German aurist's belief, they bear to the entire mass of diseases of the organ of hearing. It is easy to give names to diseases and to attach numbers thereto, it is another matter faithfully to record the appearances which each case presented during life or exhibited after death. When Dr. Kramer has demonstrated to a public class of students and practitioners capable of observing for themselves—the only true method of clinical investigation—the healthy character of the membrana tympani in one-half of the next 2000 cases which he publishes, I think his figures may, but not until then, be placed in comparison with the facts described by British observers. Statistical tables and calculations are really valuable only when we can rely upon the original investigations from which they were deduced; if the materials have been loosely collected, or for any special purpose, or to support any preconceived theory, such circumstances naturally influence the value to be set upon all subsequent arrangements, no matter how ingenious. Statistical calculations remind one of the kaleidoscope, which, when turned or shaken, presents new and beautiful combinations of figure and colour, irrespective of the objects which produced such being crooked pins and glass beads or spangles and diamonds.

Dr. Tscharner of Berne published in 1849 the result of 200 cases in a small tract, *Beitrag zur Statistik der Ohrenkrankheiten*, the sexes being in the proportion of 115 men to 85 women. Among these, both ears were affected in 158 cases; the right in 22, and the left in 20. The diseases recorded affected the different portions of the organ of hearing in the following proportions:—The auricle, 10; external meatus and auditory canal, 163; the membrana tympani, 122; the cavitas tympani, 70; the Eustachian tube, 74; and the labyrinth, 72: but the diseases affecting several of these parts co-existed. The proportion of diseases of the labyrinth which the author has recorded, and which we are led to suppose he diagnosed, would, if true, be curious. It is un-

necessary to follow the author through his various and ingenious tables further. Mr. Yearsley and Dr. Schmalz have likewise written upon, and published tables of the statistics of, ear diseases.

As already stated at page 37, Mr. Toynbee has dissected the ears of 750 persons furnished to him from different sources; and of these he has published the result of the examination of 915 ears.* Of these, 303 were in a healthy state; and on this small proportion of only one-third found in a normal condition the author remarks, "To those, however, who have given the subject much consideration, and who are aware of the wide-spread prevalence of deafness in its varying degrees among all classes of society, the dissections will not, perhaps, be thought to exhibit any unusual proportion of diseased to healthy specimens." Of the remaining 612 ears, 184 had belonged to persons who were known during life to have been deaf, and these are the really valuable cases, though it would have much increased their value had the amount of deafness and other symptoms during life been recorded; 70 showed upon dissection such manifest traces of disease as left little doubt that the persons must have had in life defective hearing; and 358 were believed by the author to be in a state of incipient deafness. The following summary gives the result of these investigations; but so many ears exhibited morbid appearances in different parts, that the totals of the different sections are not to be considered as making up the entire 612 ears.

The external meatus showed disease in 80 instances, or 1 in $10\frac{1}{2}$: consisting of,—collections of cerumen and epithelium, 58; of pus and epithelium, 13; contraction of canal with alterations in its lining membrane and osseous parietes, 9.

The membrana tympani was diseased in 209 instances, or nearly 1 in every 3; of these there were, with the membrane white, thickened, or vascular, 52; concave externally or flat, 15; concave, and adhering to promontory, 21; concave, with deposits of calcareous matter, 4; perforated, or altogether destroyed, 51; and adherent to, or connected by bands with, the ossicula or promontory, 66.

* See the Medico-Chirurgical Transactions, vols. xxiv. 1841, xxvi. 1843, xxxii. 1849,—this last contains tables for the entire.

The cavitas tympani presented evidences of disease in the following proportions; it contained morbid collections in 107 examinations, or about 1 in every 6, to speak in round numbers; consisting of,—collections of mucus, with the lining membrane healthy, 43; and with the membrane thickened, 5; filled with portions of cerumen and epithelial scales, the result of destruction or perforation of the membrana tympani, 2; containing pus, with the membrane thickened, 15; filled with blood, 4; with serum or lymph, 10; scrofulous matter, 20; oily matter, 1; and calcareous matter, 7.

The mucous membrane of the cavitas tympani was diseased in 310 cases, or more than one-half of those examined. In 66 instances it was more vascular than natural; in 179 it was thickened; in 22 so thick as to bury the whole of the stapes; in 8 so thick as to fill the tympanum; and in 5 it was pulpy. The remaining examinations showed the membrane ulcerated and thick, 20; with black pigment secreted beneath it, 2; with blood effused under it, 8; and with serum in the same position, 1. It is probable, however, that some of these latter appearances may have been *post-mortem* products, and that many of the characters detailed in this section generally may have resulted from the diseases which were the immediate causes of death in the patients, and not from any previous affections in the organs of hearing.

Bands of adhesion were found to exist in the cavity of the tympanum in 179 cases, or 1 in 3·42 of the whole. These bands passed between the stapes and promontory in 130 instances; were connected with the incus, stapes, and promontory in 8; joined the malleus with surrounding parts in 12; connected all the ossicles in 13; the ossicles with the promontory in 9; the tensor tympani muscle and the stapes in 3; and the chorda tympani nerve, with the adjacent parts, in 4.

The state of the ossicula is thus described: the malleus adherent to the promontory, 1; removed by absorption, ulceration, or caries, 6; and found with incus in mastoid cells, 1; the incus was in whole or in part removed in 10 cases; disconnected from stapes and malleus in 3; the stapes was found either partially or completely anchylosed, or more firmly attached than natural with the

fenestra ovalis, in 30 instances; disconnected or in a state of absorption, 4; and projecting into vestibule, 1; all the ossicles were either removed, carious, or disconnected, in 5 ears. Thus the number of cases in which the ossicles were diseased or displaced amounted to 61, or one-tenth of the whole, a proportion which will not appear exaggerated to persons conversant with the destructive results which follow otorrhœa with exposure of the tympanal cavity.

The osseous walls of the tympanum were: thickened, 1; carious, 2; partially deficient superiorly, 54; and inferiorly, 22. The carotid canal was contracted 3 times, making in all 82 cases of disease of the bony parietes, or 1 in every 7·46.

The membrane of the fenestra rotunda was diseased 5 times; the tensor tympani muscle atrophied, 7; and attached to stapes once.

The Eustachian tube showed symptoms of disease in 21 of the examinations, or 1 in 29; contained mucus, 10; its lining membrane thickened, vascular, or congested, 8; and with bands connecting its parietes, 3. It must, however, be remarked that it was only the upper portion of the tube which was submitted to examination.

The internal ear exhibited the following peculiarities: the membranous labyrinth thickened, 4; atrophied, 6; the labyrinthine fluids deficient, 8; the vestibule and cochlea containing bloody serum, 1; pus, 1; a band crossing the vestibule, 1.

Considerable difficulty must always be experienced in dissecting, or in discovering pathological changes in the internal ear, particularly in measuring any deficiency of its natural fluids. We find all the dissections of the internal ear in the column for the 184 persons previously known to be deaf. The following observations upon these dissections are so faithful, and so much in accordance with my own ideas upon the subject, that I insert them. "The fact of a thickened or otherwise deranged state of the mucous membrane lining the tympanic cavity being one of the most common pathological conditions of the organ of hearing, is the broadest general result of the dissections; and as cases carefully examined, noted, and studied as they have arisen

in practice, lead to the same conclusion, I have little hesitation in stating disease of that membrane to be the most usual cause of deafness. What are the history and symptoms of the great majority of cases of deafness unattended by discharge? Cold has been caught, uneasiness has been felt, renewed attacks of cold have added to the severity of the symptoms; advice is at length sought, and examination shows the external meatus deprived of cerumen, and frequently deficient in natural sensibility, while, towards the membrana tympani, its appearance is red and smooth; the membrana tympani is entire, its surface shines, but it is hazy, opaque, or as white as parchment, and, consequently, the handle of the malleus may be discerned with varying degrees of distinctness, or cease to be visible at all. Upon a forcible expiration with closed nostrils, the air, by means of the otoscope,* can almost always be heard to enter the tympanum, not gradually, however, as when the organ is healthy, but with a puffing, bubbling, or cracking sound, as though impeded in its progress."

I have at page 52 described the method of taking cases at St. Mark's Hospital. The history, progress, and treatment of the first twenty-four cases in the following Registry have been already detailed at length in the Medical Times and Gazette, for 1851 and 1852, a reference to which will show the manner in which they were reported; and portions of them are inserted in the body of this work. The remainder are susceptible of publication like the former, did space permit. From the voluminous notes of these, the following abstract of 200 instances which presented, in succession, during the early part of the year 1850, has been drawn up. Many other cases occurred of simple impaction of the external auditory canal with cerumen, which have not been included in the following abstract, except where, upon the removal of the mechanical impediment, the lining of the canal, or the external surface of the membrana tympani, appeared diseased from other causes, or in consequence of the long-continued presence of the offending body.

* Otoscope—an elastic stethoscope, eighteen inches long, the ends tipped with ivory; one extremity of which is inserted into the meatus of the patient, and the other applied to that of the examiner.

No. of Case.	Sex.	Age. — Yrs.	Ear affected.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
1	M.	20	R.	14 years.	8 inches.	Normal.	Dry, white, and polished; had discharge formerly.
			L.	Ditto.	6 inches.	Ditto.	Ditto.
2	F.	25	R.	4 years.	5 inches.	Normal.	Filled with muco-purulent discharge.
3	M.	19	R.	. . . .	Touching.	Normal; post-aural gland in a state of suppuration.	Normal.
4	M.	30	L.	1 month.	Touching.	Normal.	Dry, polished, grey; no cerumen.
			R.	Ditto.	None.	Ditto.	Pale; more polished than left.
5	M.	25	L.	. . . .	4 inches.	Normal.	Impacted with hard, inspissated cerumen; on its removal, cuticle thickened and white.
6	M.	20	R.	6 months.	None.	Normal.	Long and tortuous; lining membrane natural.
			L.	Ditto.	On pressure.	Ditto.	Ditto.
7	F.	14	L.	1 year.	Touching.	Normal.	Filled with creamy fetid discharge, through which a reddish polypus appears, growing from fundus of canal.
			R.	Ditto.	3 inches.	Ditto.	Coated with discharge; membrane thickened.
8	F.	20	R.	4 years.	6 inches.	Normal.	Filled with discharge; membrane pinkish.
			L.	Ditto.	On pressure.	Ditto.	Dry and scaly.
9	F.	30	R.	Years.	3 inches.	Normal.	Normal.
			L.	. . . .	12 inches.	Ditto.	Ditto.
10	M.	25	L.	2 months.	None.	Normal.	Dry; no cerumen.
			R.	Ditto.	2 inches.	Swollen.	Filled by an abscess of integument.
11	F.	30	B.	Years.	. . . .	Normal.	Remarkably small.
12	M.	16	R.	Years.	3 inches.	Normal.	Normal.
			L.	. . . .	Touching.	Ditto.	Ditto.
13	M.	11	L.	14 days.	3 inches.	Normal.	Filled with whitish discharge.
			R.	Ditto.	4 inches.	Ditto.	Filled with cerumen.
14	M.	40	L.	6 weeks.	2 inches.	Normal.	Filled with brown, hard cerumen, hairs, and epithelium; membrane thickened and detached.
15	F.	46	B.	10 years.	None on either side.	Normal.	Small, dry, pinkish; no cerumen.
16	M.	46	L.	14 days.	None.	Normal.	Contains tenacious muco-cerumenous discharge, and flakes of detached cuticle; membrane florid red.
17	F.	18	L.	2 years.	3 inches.	Normal.	Filled with muco-purulent discharge, containing air globules; membrane pink.
18	M.	24	L.	3 months.	Normal.	A tumour containing glairy fluid in helix.	Normal.

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
Mottled, red and white; rough and irregular; thickened; malleus not distinguishable.	Uninflatable.	None.	None.	Normal.	Cold and exposure.
More polished than on right; a crescent of opacity occupies lower edge.	Ditto.	Ditto.	. . . .	. . . .	. . . .
Quite destroyed.	Membrane exposed; deep-red, smooth.	None.	Buzzing.	Normal.	Scarlatina.
Partially thickened, and opaque. .	. . . . .	Dull throbbing in tumour.	. . . .	Tonsils enlarged.	Scrofula.
Of a general pinkish hue; crescentic opacity inferiorly; polished.	Inflatable.	Singing.	None.	Ulcerated.	Syphilis.
Very red; collapsed; malleus projecting.	Uninflatable.	Ditto.	Tidal.	. . . .	. . . .
Thickened, with red patches. . . .	Inflatable.	. . . .	Singing and rustling.	Normal.	. . . .
Thickened and opaque; collapsed. .	Uninflatable.	. . . .	Singing.	Normal.	Falling into the sea.
Thickened, opaque, and reddish. .	Ditto.	. . . .	Hissing.	. . . .	. . . .
On removing polypus, membrana tympani found to be opaque and vascular.	Inflatable.	Severe, lancinating; varies.	. . . .	. . . .	Cold and draught.
Pinkish; thickened.	. . . . .	. . . .	. . . .	. . . .	. . . .
Completely destroyed.	Lining thickened, red, pulpy.	None at present.	None.	Normal.	Scarlatina.
Thickened; opaque; studded with small white specks; collapsed.	Uninflatable.	. . . .	Ditto.	. . . .	. . . .
Pearl-coloured; thickened by interstitial deposit; unpolished; very opaque posteriorly.	Inflatable.	Great.	Hammering.	Normal.	. . . .
Slightly opaque.	Ditto.	. . . .	. . . .	. . . .	. . . .
Deep pink ring inferiorly; dense white spot in middle.	Uninflatable.	Severe.	Falling of water.	Membrane red, swollen.	Cold.
Cannot be seen.	. . . . .	Ditto.	Loud reports	. . . .	. . . .
Collapsed; spotted by grey patches.	Inflatable.	None.	Sawing.	Normal.	. . . .
Collapsed; white, thickened, opaque; lower edge vascular.	Uninflatable.	Slight and occasional.	None.	Uvula elongated.	Cold.
A uniform rose-leaf colour. . . .	Ditto.	. . . .	Singing.	. . . .	. . . .
Covered by layer of yellow lymph.	. . . . .	Slight.	. . . .	Normal.	. . . .
. . . . .	. . . . .	. . . .	. . . .	. . . .	. . . .
Thickened, whitish, succulent, and vascular.	Inflatable.	. . . .	Boiling and loud reports.	Normal.	. . . .
Collapsed, thickened, white; slightly vascular; malleus projecting.	Slightly inflatable.	None.	Loud and incessant.	Normal.	Nervousness
Pinkish; spots of yellow lymph effused on surface.	. . . . .	Severe.	Buzzing and throbbing.	Normal	. . . .
Pink; small aperture in upper and posterior part; air passes with squeeling noise.	Inflatable.	None.	None.	Normal.	Scarlatina.
Normal.	Normal.	Auricle hot, and slightly painful.	. . . .	Normal.	. . . .

No. of Case.	Sex.	Age. — Yrs.	Ear affec-ted.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
19	F.	19	B.	1 year.	Normal.	Fibrous tumour in centre of each lobe.	Normal. . . . .
20	F.	54	L.	4 years.	Touching.	Thickened.	Elongated slit; edges collapsed; canal white, thickened, and contains curdy fluid.
21	F.	25	L.	8 months.	Touching.	Normal.	Closed by condylomata round margin; fetid sanious discharge.
22	F.	60	B.	Years.	Touching.	Swollen, misshapen, fiery-red, with yellow crusts; ichorous exudation.	Decreased one-third; filled with branny scruff.
23	F.	52	B.	6 years.	None.	Hard, thickened, enlarged, its fossæ obliterated; a dusky brown.	A narrow slit, filled with crusts; lining ulcerated.
24	F.	47	R.	Years.	On pressure.	Normal.	Filled by mulberry-like tumour, growing from anterior margin, and extending into canal.
25	M.	55	R.	4 years.	None.	Normal.	Normal. . . . .
			L.	Ditto.	2 inches.	Ditto.	Dry; no cerumen. . . . .
26	F.	7	L.	1 month.	3 inches.	Normal.	Normal. . . . .
27	M.	11	R.	2 years.	2 inches.	Normal.	Normal. . . . .
			L.	Ditto.	Ditto.	Ditto.	Ditto. . . . .
28	M.	7	R.	18 months.	4 inches.	Normal.	Filled with cerumen. . . . .
			L.	Ditto.	3 inches.	Ditto.	Contains thick caseous discharge. . .
29	M.	32	R.	Years.	6 inches.	Normal.	Filled by discharge; walls thickened.
			L.	Ditto.	2 feet.	Ditto.	Normal. . . . .
30	M.	15	B.	9 years.	4 inches.	Normal.	Membrane thickened and pulpy; a profuse discharge.
31	M.	9	B.	3 weeks.	3 inches.	No lobe.	Narrowed. . . . .
32	F.	30	L.	5 days.	4 inches.	Normal.	Much narrowed. . . . .
			R.	Uncertain.	8 inches.	Ditto.	Dry and contracted. . . . .
33	M.	14	R.	3 years.	4 inches.	Normal.	Filled by discharge and polypus. . .
34	M.	38	R.	3 months.	3 inches.	Normal.	Normal. . . . .
			L.	Ditto.	6 inches.	Ditto.	Ditto. . . . .
35	F.	30	R.	14 years.	None.	Normal.	Normal. . . . .
			L.	Ditto.	1 inch.	Ditto.	Ditto. . . . .

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
Normal.	Inflatable.	Originally in apertures for earrings.	None.	Normal.	Piercing lobes.
White and thickened.	. . . . .	None.	Tinnitus.	Normal.	. . . .
Cannot be seen.	. . . . .	Occasional.	Tinnitus.	Normal.	Cold.
Thickened and opaque.	. . . . .	Soreness and itching.	. . . .	Normal.	. . . .
Invisible, owing to thickening of auditory canal.	. . . . .	On pressure.	Tinnitus.	Normal.	Erysipelas of head and face.
Cannot be seen.	. . . . .	Tumour becomes painful occasionally.	. . . .	Normal.	. . . .
Densely opaque; like parchment. .	Uninflatable.	Previous.	None.	Normal.	. . . .
Thickened, opaque, and collapsed. .	Ditto.	None.	Ditto.	. . . .	. . . .
Pinkish at circumference; opaque in centre.	Inflatable.	Severe pain at night originally.	Throbbing.	Normal.	Severe cold day.
Slightly opaque, but polished. . .	Inflatable.	Came on with pain.	. . . .	Normal.	Cold.
Pinkish and opaque.	Ditto.	Ditto.	. . . .	. . . .	Ditto.
White and thickened.	. . . . .	None.	. . . .	Normal.	. . . .
Ditto.	. . . . .	Ditto.	. . . .	. . . .	. . . .
Slightly thickened, opaque; an aperture size of pin's head anteriorly, filled by vibrating bubble.	Inflatable.	None.	None.	Normal.	A blow on the ear.
Thickened; a white triangular deposit in front of malleus.	Uninflatable.	. . . .	. . . .	. . . .	. . . .
Thickened, opaque, vascular. . . .	Inflatable.	None.	. . . .	Tonsils enlarged.	Scarlatina.
Pink, and thickened.	Inflatable.	None.	. . . .	Normal.	Scrofula.
Collapsed; blood-red superiorly. .	Inflatable.	None.	Great, like roaring of sea.	Normal.	Occupation of laundress.
Thickened and opaque, showing previous disease.	Uninflatable.	. . . .	. . . .	. . . .	Ditto.
Thickened, vascular; large aperture posteriorly.	Inflatable.	Pain on accession of cold.	None.	Relaxed.	Cold.
Collapsed, dense, white, thickened; in centre of vibrating portion a clear, thin, depressed spot, with elevated margin from previous ulcer; a pinkish circle inferiorly.	Inflatable.	None.	Like steam-engine; increased by cold.	Membrane red and relaxed.	Cold and pain in head.
Dense, thick, opaque, pearly, dimmed.	. . . . .	Ditto.	Ditto.	. . . .	. . . .
Thickened and opaque.	Inflatable.	In head.	Loud.	Tonsils enlarged.	Scarlatina.
Red and thickened.	Ditto.	Previously.	Ditto.	. . . .	. . . .

No. of Case.	Sex.	Age. — Yrs.	Ear affected.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
36	M.	15	L.	2 years.	None.	Normal.	Large firm polypus projecting externally, cuticular on exposed surface; discharge.
			R.	Ditto.	4 inches, on removing discharge.	Ditto.	Discharge; small polypus growing from anterior wall.
37	F.	19	R.	6 months.	1 inch.	Normal.	Yellow discharge; large flabby polypus occupies fundus.
			L.	Ditto.	Touching.	Very small.	Ditto . . . . .
38	F.	38	R.	2 months.	2 inches.	Normal.	Enlarged, dry, scaly, pinkish; purulent discharge, with air bubbles.
			L.	Ditto.	None.	Ditto.	Filled with caseous deposit. . . . .
39	F.	15	R.	10 years.	. . . .	Normal.	Normal. . . . .
40	M.	16	L.	4 months.	8 inches.	Normal.	Filled by small polypus; discharge. .
41	F.	50	L.	5 years.	. . . .	Helix obliterated by pressure.	A mere slit, dry, scaly, plugged with hard cerumen.
42	F.	30	L.	14 days.	6 inches.	Normal.	Membrane polished, pink; profuse discharge began three days after pain, which then ceased.
43	M.	45	L.	6 months.	None.	Normal.	Diminished, lower extremity vascular, swelling and pain in mastoid region.
44	M.	38	R.	15 years.	None.	Normal.	Walls thickened, opaque; discharge.
45	F.	23	R.	5 weeks.	None.	Normal.	Dry, and devoid of cerumen . . .
46	F.	50	B.	3 months.	1 foot.	Normal.	Filled by dark, sticky cerumen. . .
47	F.	21	L.	11 years.	2 inches.	Normal.	Thin muco-purulent discharge. . . .
48	M.	20	L.	1 month.	2 inches.	Normal.	Dry, devoid of cerumen. . . . .
			R.	3 weeks.	6 inches.	Ditto.	Ditto. . . . .
49	M.	17	L.	13 years.	None.	Normal.	Dry, membrane pinkish inferiorly. .
			R.	Ditto.	Touching.	Ditto.	Ditto. . . . .
50	M.	4	L.	. . . .	. . . .	Lobe ulcerated from discharge.	Thickened, ulcerated, filled with discharge.
51	F.	44	B.	6 years.	3 inches.	Normal.	Devoid of cerumen. . . . .
52	M.	48	B.	18 days.	None.	Normal.	Dry, scaly, no cerumen; originally a discharge of bloody fluid.
53	F.	22	R.	20 years.	Touching.	Normal.	Filled by condylomata; fetid discharge.
			L.	Ditto.	1 inch.	Ditto.	Dry, devoid of cerumen. . . . .
54	M.	7	L.	1 month.	3 inches.	Normal.	Normal. . . . .

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
Invisible at time of note, owing to size of polypus and discharge.	. . . . .	None.	. . . .	Normal.	Scarlatina.
Only partially visible ; whitish, thickened.	. . . . .	. . . .	. . . .	. . . .	Ditto.
Tolerably clear and perfect. . . .	. . . . .	None.	Like bells.	Glands enlarged; the voice very harsh.	. . . .
Ruptured inferiorly; reddish granulations growing over it.	. . . . .	Ditto.	Ditto.	. . . .	. . . .
Vascular, opaque, perforated. . . .	Inner wall of tympanum seen through aperture.	None.	. . .	Normal.	Cold.
Unseen.	. . . . .	Ditto.	. . . .	. . . .	. . . .
Opaque, pinkish, perforated in centre.	. . . . .	. . . .	Bellows.	Normal.	Fever.
Normal.	. . . . .	At night.	None.	Normal.	. . . .
Dense, white, mottled, somewhat pink posteriorly.	Uninflatable.	Occasionally	Buzzing.	Normal.	Sitting at open window.
Highly vascular, perforated inferiorly.	Inflatable; membrane pinkish.	Originally violent at night.	Tinnitus in ear and head.	Normal.	Cold and exposure.
Of a uniform pinkish tint.	Uninflatable.	Severe, with pulsation.	Frying and buzzing.	Normal.	Suppressed perspiration.
Thickened, opaque, has lost polish.	Uninflatable.	None.	Tinnitus.	Normal.	. . . .
Very opaque, thickened posteriorly, pinkish anteriorly.	Inflatable.	Much at night.	Beating in ear and head.	Normal.	Sleeping in wet clothes.
Collapsed ; a dense white crescent inferiorly.	Uninflatable.	None.	Singing.	Normal.	. . . .
Red and granular.	. . . . .	Severe.	None.	Normal.	. . . .
Covered with red vessels; malleus scarcely discernible; its site marked by an opaque line.	. . . . .	Slight, increased on sneezing.	Tidal.	Normal.	Heats and colds.
A florid red.	. . . . .	Ditto.	Ditto.	. . . .	. . . .
Opaque, thickened, irregularly spotted, vascular superiorly.	Eustachian tubes free ; air has a whistling sound.	Occasionally violent	Like waterfall.	Normal.	Fever.
A pale pink over outline of malleus.	Whistling sound.	Ditto.	Ditto.	. . . .	. . . .
Thickened, vascular, perforate at inferior edge.	Mucous discharge from.	Originally.	None.	Normal.	. . . .
Thickened and opaque, vascular above.	Only occasionally pervious to air.	Occasionally	Buzzing and beating.	Normal.	. . . .
Dark red, thickened, dry.	. . . . .	Violent.	Buzzing.	Normal.	Wet and cold.
Invisible.	. . . . .	. . . .	None.	Normal.	. . . .
Collapsed; defined, crescentic opacity inferiorly.	. . . . .	. . . .	. . . .	. . . .	. . . .
Uniform pink colour.	Inflatable.	None.	None.	Normal.	Cold.

No. of Case.	Sex.	Age — Yrs.	Ear affected.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
55	F.	25	R.	For years.	3 inches.	Normal.	Dry, no cerumen. . . . .
			L.	. . . .	5 inches.	Ditto.	Dry and scaly. . . . .
56	M.	12	L.	3 months.	4 inches.	Normal.	Dry. . . . .
			R.	Ditto.	Normal.	Ditto.	Filled with honey-like cerumen. . .
57	F.	50	R.	. . . .	. . . .	Hard, elevated, sensitive cicatrices on helix.	Mucous secretion, containing air globules.
58	M.	40	L.	1 month.	None.	Normal.	Dry. . . . .
59	F.	20	L.	Many years.	. . . .	Normal.	Dry and white. . . . .
			R.	Ditto.	. . . .	Ditto.	Ditto. . . . .
60	M.	16	R.	3 years.	4 inches.	Normal.	Contracted, walls thickened ; filled with crusts of inspissated mucus ; has occasional discharge.
			L.	Ditto.	2 inches.	Ditto.	Membrane thickened and pulpy ; profuse discharge.
61	F.	14	B.	3 months.	Impaired after fits.	Normal.	Normal. . . . .
62	M.	50	R.	2 weeks.	6 inches.	Normal.	Normal. . . . .
63	F.	25	L.	6 months.	Touching.	Normal.	Pinkish at lower extremity. . . . .
			R.	. . . .	Ditto.	Ditto.	Impacted with cerumen ; the cuticle of canal and membrana tympani removed with it.
64	M.	25	B.	2 weeks.	Touching.	Normal.	Filled with hard cerumen. . . . .
65	F.	3	R.	2 years.	None.	Normal.	Coated with discharge. . . . .
66	M.	40	R.	10 years.	None.	Normal.	Dry, devoid of cerumen. . . . .
			L.	Ditto.	3 inches.	Ditto.	Ditto. . . . .
67	M.	68	L.	Many years.	. . . .	Normal.	Dry. . . . .
68	F.	14	L.	. . . .	Touching.	Helix wanting.	Only size of crow-quill. . . . .
69	F.	50	L.	8 months.	None.	Flattened by long pressure of a band ; helix obliterated.	Walls, touch resembling a slit ; lining white, thickened, exuding discharge ; bottom filled with hard cerumen.
70	M.	16	R.	10 years.	. . . .	Normal.	Walls white, thickened ; coated with discharge.
71	F.	21	L.	10 years.	Touching.	Normal.	Filled by discharge ; granular polypus.
72	F.	50	B.	14 years.	None.	Normal.	Dry, devoid of cerumen. . . . .

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
Thickened, opaque; atheromatous deposit, of crescent shape posteriorly; mottled anteriorly; polished.	Uninflatable.	None.	Like carriages.	Normal.	. . . .
Thickened and opaque.	Ditto.	Ditto.	Ditto.	. . . .	. . . .
Thickened, collapsed, pinkish. . .	. . . . .	None.	Occasional.	Normal.	Cold.
Normal.	. . . . .	. . . .	. . . .	. . . .	. . . .
Thickened, vascular; large aperture anteriorly.	Inflatable.	. . . .	. . . .	Normal.	. . . .
Rather opaque, dim; a cicatrix in anterior part running from above downwards, which becomes red on inflation; had hæmorrhage from ear after fall.	Inflatable.	Occasionally	Incessant, like steam-engine.	Normal.	Fall on back of head, against street railing.
Slightly collapsed; centre natural; dense white opacity, with defined edge round inferior circumference.	. . . . .	Occasionally severe.	. . . .	Normal.	. . . .
Similar to left, but thin, and of a skim-milk colour.	Inflatable.	Ditto.	. . . .	. . . .	. . . .
Thickened; one-half destroyed inferiorly.	Memb. pulpy and florid red; air cannot pass into tympanum; trying to inflate reddens memb.	None.	Great and continuous. A rare case.	Normal.	. . . .
Almost entirely destroyed; a thick white patch containing malleus above.	Ditto.	Ditto.	Ditto.	. . . .	. . . .
Slightly thickened on both sides. .	. . . . .	. . . .	. . . .	Normal.	Fall on her head.
Rough, florid red, granular. . . .	. . . . .	Lacerating.	Blowing.	Normal.	Cold and exposure.
Pinkish, with crescentic opacity at lower edge; polished.	Inflatable; increasing colour in M. T.	Intermitting	None.	Normal.	. . . .
Slightly vascular; thickened, opaque.	Uninflatable.	. . . .	. . . .	. . . .	. . . .
White, thickened; pulpy from pressure.	. . . . .	. . . .	Buzzing.	Normal.	Influenza.
Quite destroyed.	. . . . .	None at present.	. . . .	Normal.	Scarlatina; glandular swellings.
Uniformly opaque; white, thick. .	. . . . .	None.	Tinnitus.	Normal.	. . . .
Thickened, opaque; skim-milk colour.	. . . . .	Ditto.	Ditto.	. . . .	. . . .
Thickened and opaque.	. . . . .	. . . .	. . . .	Normal.	. . . .
Only partially visible.	. . . . .	Pain.	. . . .	Normal.	. . . .
Dense white, mottled with pink. . .	. . . . .	Occasional.	Buzzing.	Normal.	A cold draught.
Pulpy, thickened, white.	Uninflatable.	. . . .	. . . .	Normal.	. . . .
Unseen.	. . . . .	. . . .	None.	Normal.	. . . .
Much collapsed, thickened, opaque.	Uninflatable.	. . . .	Loud, tidal.	Normal.	. . . .

No. of Case.	Sex.	Age. — Yrs.	Ear affected.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
73	F.	20	L.	4 months.	4 inches.	Normal.	Epithelium thickened, peeling off; yellow mucous discharge.
			R.	. . . .	2 inches.	Ditto.	Filled with caseous matter; membrane white and pulpy.
74	M.	45	B.	A few days.	3 inches.	Normal.	Impacted with dark cerumen, epithelial scales, and hairs.
75	M.	15	L.	4 years.	Touching.	Normal.	Dry, and devoid of cerumen. . . . .
76	M.	30	R.	1 year.	4 inches.	Normal.	Dry and scaly; no cerumen. . . . .
77	M.	40	R.	9 years.	8 inches.	Normal.	Scaly; mottled by specks of blood. .
78	M.	40	R.	9 weeks.	Touching.	Normal.	Elliptical, dry, scaly, florid pink. . .
			L.	. . . .	3 feet.	Ditto.	Dry, elliptical,—apparently congenital.
79	F.	4	R.	1 month.	. . . .	Eczematous.	Covered with whitish exudation. . .
80	M.	23	R.	3 years.	1 inch.	Normal.	Dry, scaly; had discharge for a month after first attack.
			L.	. . . .	Touching.	Ditto.	Dry and scaly; no cerumen. . . .
81	M.	61	R.	2 years.	None.	Normal.	Devoid of cerumen. . . . .
			L.	. . . .	Touching.	Ditto.	Normal. . . . .
82	M.	25	L.	5 months.	2 inches.	Normal.	Discharge, from sudden burst. . . .
83	F.	15	B.	1 year.	. . . .	Thickened, red, eczematous.	Filled by cerumen, limiting extent of eczema.
84	M.	18	B.	6 months.	4 inches.	Normal.	Filled by cerumen. . . . .
85	F.	6	L.	. . . .	4 inches.	Normal.	Filled by pitch-like wax. . . . .
			R.	. . . .	6 inches.	. . . . .	Honey-like wax pours out. . . . .
86	M.	26	R.	4 years.	None.	Normal.	Florid red; bony protuberance attached anteriorly; discharge; had polypus two years ago.
87	F.	26	L.	1 month.	Touching.	Normal.	Long and tortuous, devoid of cerumen, white, polished.
			R.	4 years.	Ditto	Ditto.	Ditto. . . . .
88	M.	19	L.	1 year.	4 inches.	Normal.	Normal. . . . .
			R.	Years.	6 inches.	Ditto.	Ditto. . . . .
89	F.	8	R.	4 months.	3 inches.	Normal.	Normal. . . . .
90	M.	12	L.	1 year.	3 inches.	Normal.	Dry; devoid of cerumen. . . . .
			R.	. . . .	2 inches.	No conch or lobe.	Normal. . . . .
91	F.	22	B.	4 years.	4 inches.	Normal.	Normal. . . . .
92	F.	37	L.	3 years.	Touching.	Normal.	Scaly; no cerumen. . . . .
			R.	. . . .	Ditto.	Ditto.	Scaly; contracted from exostosis. .
93	M.	15	L.	11 years.	1 inch.	Normal.	Dry; lining pink. . . . .
			R.	Ditto.	Touching.	Ditto.	Filled with cerumen. . . . .
94	F.	15	L.	9 years.	None.	Normal.	Dry; no cerumen. . . . .
			R.	Ditto.	Touching.	Ditto.	Ditto. . . . .

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
Collapsed, thickened, pink; small slit posteriorly; air whistles through.	Inflatable.	Numb.	Loud and continuous.	Normal.	Sudden cold.
Much collapsed; dense white; triangular aperture anteriorly, with indented edges; red membrane of middle ear seen through.	Ditto.	None.	Bellows.	. . . .	. . . .
External layer white, thickened, pulpy, adherent to cerumen.	. . . . .	Pains in head.	Severe; vertigo.	Normal.	. . . .
Normal.	. . . . .	In head.	Buzzing.	Normal.	Headach.
Collapsed; slightly thickened; mottled with white spots; vascular above malleus.	Uninflatable.	None.	Blowing; giddiness.	Normal.	. . . .
Red patch in front of malleus. . .	. . . . .	Pain.	Stuffing.	Normal.	Cold.
Uniform dark red; malleus imperceptible.	In suppuration	Great.	Throbbing.	Normal.	. . . .
Collapsed, thickened, opaque; malleus very prominent.	Uninflatable.	None.	Whizzing.	. . . .	. . . .
Covered with whitish exudation. .	. . . . .	. . . .	. . . .	Normal.	. . . .
Collapsed, thickened, opaque; slightly pinkish; dense yellow spot before malleus.	Inflatable; redness of M. T. increased; report on inflat.	Pain and soreness.	Buzzing.	Normal.	Cold.
Polished, pink.	Inflatable.	Soreness.	Buzzing.	Relaxed, red.	. . . .
Pink, but polished.	Inflatable.	Originally.	A grating.	Normal.	. . . .
Thickened, opaque, vascular superiorly.	Ditto.	. . . .	Ditto.	. . . .	. . . .
Florid red.	. . . . .	Rheumatic.	Hammering.	Normal.	Cold.
Slightly opalescent.	Inflatable.	Soreness and itchiness.	. . .	Normal.	Scarlatina.
Surface red, pulpy.	Inflatable.	Pain.	Buzzing.	Normal.	. . . .
Vascular from offending body. . .	. . . . .	None.	Singing.	Normal.	. . . .
Normal.	. . . . .	Ditto.	Ditto.	. . . .	. . . .
Totally removed.	Promontory plainly seen.	None.	None.	Normal.	Diving in the sea.
Thickened, opaque, pinkish crescent inferiorly; malleus prominent.	Inflatable.	Slight.	Tinnitus.	Normal.	Cold.
Collapsed, unpolished, white above, red below; malleus prominent.	Uninflatable.	None.	Ditto.	. . . .	. . . .
Pinkish spot anteriorly, thin, transparent, projecting like elastic membrane in ulcer of cornea.	Inflatable; increases projection.	Originally.	Bellows.	Normal.	Cold.
Thickened, vascular; aperture near point of malleus.	Inflatable.	. . . .	None.	. . . .	. . . .
Collapsed, red, thickened.	Inflatable.	None.	Tinnitus.	Normal.	. . . .
Thickened, opaque; several vascular elevations; pink crescent inferiorly.	Uninflatable.	None.	None.	Normal.	Typhus fever.
Pink and thickened.	Inflatable.	None.	Tinnitus.	Ditto.	. . .
Thickened, opaque, pearl-coloured.	Inflatable.	. . . .	Tinnitus.	Normal.	. . . .
Collapsed, unpolished; malleus prominent; yellow, atheromatous deposit inferiorly.	Uninflatable.	None.	Waterfall.	Normal.	Influenza.
Collapsed; white spot in centre. .	Ditto.	Ditto.	Ditto.	. . . .	. . . .
Pink; aperture posteriorly. . . .	Mem. villous.	None.	Ticking.	C. tonsillitis.	Cold.
White and pulpy.	. . . . .	Ditto.	Singing.	. . . .	. . . .
A uniform dense white.	. . . . .	None.	. . . .	Normal.	Measles.
Opaque; like skimmed milk. . .	. . . . .	. . . .	. . . .	. . . .	. . . .

No. of Case.	Sex.	Age. — Yrs.	Ear affected.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
95	F.	25	B.	4 months.	1 inch.	Normal.	Dry and scaly. . . . .
96	M.	16	L.	1 month.	Touching.	Normal.	Pink, moist, some cerumen inferiorly.
			R.	2 months.	Ditto.	Ditto.	Pink. . . . .
97	F.	7	R.	2 years.	None.	Normal.	Filled by yellow, bloody discharge. .
			L.	. . . .	None.	Ditto.	Filled by inspissated discharge. . .
98	F.	10	R.	3 months.	2 inches.	Normal.	Normal. . . . .
			L.	. . . .	1 inch.	Ditto.	Ditto. . . . .
99	M.	7	B.	3 years.	4 inches.	Normal.	Normal. . . . .
100	M.	40	R.	Years.	None.	Normal.	Filled by caseous matter, containing air globules.
			L.	Ditto.	None.	Ditto.	Filled by thick discharge. . . . .
101	M.	37	L.	12 years.	None.	Normal.	Enlarged, dry, pinkish ; no cerumen.
			R.	Ditto.	3 feet.	Ditto.	Dry, scaly ; normal in colour. . . .
102	M.	62	R.	Since childhood.	None.	Normal.	Coated with discharge. . . . .
103	M.	14	R.	4 years.	3 inches, increased by discharge.	Normal.	Coated with fetid discharge. . . . .
			L.	Ditto.	1 inch.	Ditto.	Normal. . . . .
104	F.	30	L.	9 years.	None.	Normal.	Normal. . . . .
			R.	Ditto.	Touching.	Ditto.	Filled with cerumen. . . . .
105	F.	16	L.	6 months.	None.	Normal.	Filled with cerumen. . . . .
			R.	. . . .	1 inch.	Ditto.	Normal. . . . .
106	F.	25	L.	14 days.	2 inches.	Normal.	Dry ; no cerumen. . . . .
107	F.	10	R.	5 years.	1 inch	Normal.	Normal. . . . .
108	M.	21	R.	. . . .	None.	Normal.	Normal. . . . .
109	F.	15	R.	10 years.	2 inches.	Normal.	Dry, pinkish; no cerumen. . . . .
			L.	2 years.	Touching.	Ditto.	Coated with discharge, which intermits.
110	F.	4	L.	1 year.	6 inches.	Normal.	Filled by sanious discharge ; small polypus attached posteriorly.
111	F.	50	R.	7 years.	1 inch.	Normal.	No cerumen. . . . .
			L.	. . . .	Ditto.	Ditto.	Normal. . . . .
112	F.	20	R.	Years.	1 inch.	Normal.	White, polished ; no cerumen. . . . .
113	F.	12	R.	4 years.	Touching.	Normal.	No cerumen ; pinkish. . . . .

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
Thickened; streaked with red. . .	Inflatable.	None.	Tidal.	Normal.	Cold.
Pink; deep red crescent inferiorly; several scarlet vessels on surface, radiating from point of malleus.	Inflatable; increasing redness.	Dull.	Bellows.	Normal.	. . . .
A uniform light pink.	Ditto.	Ditto.	Ditto.	. . . .	. . .
Completely removed.	White bubble in Eustach. opening.	Great originally.	. . . .	Normal.	Scarlatina; facial paralysis.
Flat, thickened; red and yellow spots.	. . . . .	. . . .	. . . .	Red.	. . . .
Opaque; pinkish inferiorly; bulged outwards in pockets.	Inflatable.	None.	None.	Normal.	. . . .
Thickened and white throughout. .	Uninflatable.	Ditto.	Ditto.	. . . .	. . . .
Thickened, opaque; like muffed glass.	. . . . .	None.	None.	Normal.	. . . .
Thickened, opaque; small aperture opposite Eustachian opening.	Inflatable.	Pain.	None.	Normal.	. . . .
Quite destroyed.	Memb. thick; exuding blood.	None.	None.	. . . .	. . . .
Unpolished; generally opaque, with pink dots; malleus projecting, marked by white line.	Inflatable.	Slight at present.	Noise increased by cold.	Normal.	Draught of cold air.
Clear in centre; white crescent inferiorly.	Ditto.	None.	None.	. . . .	. . . .
Opaque, thickened, and granular. .	Uninflatable.	. . . .	None.	Normal.	. . . .
White; thickened posteriorly; vascular anteriorly, with small valvular aperture.	Inflatable.	None.	Singing.	Normal.	Cold.
A dark-red colour.	Ditto.	Pain.	. . . .	. . . .	. . . .
Thickened, opaque, dense white. .	Inflatable.	. . . .	Chirping.	Normal.	Cold after parturition.
White, thickened; slightly vascular, probably from removing cerumen.	. . . . .	. . . .	. . . .	. . . .	. . . .
Thickened, opaque, bluish white. .	Inflatable.	None.	Tidal.	Normal.	Cold.
Ditto, ...	Ditto.	. . . .	Loud reports	. . . .	Ditto.
Vascular, wrinkled; a uniform pink colour.	Inflatable; vascularity of M. T. increased.	Pain increased at night.	. . . .	Normal.	Wet feet.
Rose-coloured, deepening in centre; polished.	Inflatable.	None.	None.	Normal.	. . . .
Normal.	Inflatable.	Deep-seated.	. . . .	Normal	Paralysis of face; ptosis.
Opaque, pink; aperture in centre, with white, thickened edge; malleus drawn upwards and backwards.	Mem. deep red; shadow from edge of rent.	None.	None.	Normal.	Fever.
Very opaque, with red spot in centre; malleus not discernible.	. . . . .	Severe.	Tinnitus.	. . . .	Bathing.
Invisible.	. . . . .	. . . .	None.	Normal.	Scarlatina.
Collapsed, thickened; irregular on surface; yellow inferiorly; whitish above.	Uninflatable.	In ears and head.	Flowing of water.	. . . .	Head shaved
Dense, yellow, irregular; dark deposit posteriorly; white streak falls from malleus.	Inflatable; M. T. projects in pouches.	Pain originally.	Boiling.	Normal.	Ditto.
Large aperture anteriorly; its edge white, thickened, inverted.	Uninflatable; rose-coloured.	. . . .	Buzzing.	Normal.	Scarlatina.
Thickened, pink, and white. . . .	Slightly infl.	None.	Ringing.	Normal.	. . . .

No. of Case.	Sex.	Age — Yrs.	Ear affected.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
114	F	21	R.	1 year.	2 inches.	Protuberance in front of tragus.	Filled with muco-purulent discharge.
			L.	. . . .	Touching.	Normal.	Small polypus attached anteriorly.
115	M.	12	R.	6 months.	2 inches.	Normal.	Filled by abscess spreading under tragus.
116	M.	42	L.	18 months.	None.	Normal.	Moist, polished. . . . .
			R.	. . . .	Touching.	Ditto.	Ditto. . . . .
117	M.	8	R.	6 months.	Touching.	Normal.	Very large; lining normal, but dry.
			L.	. . . .	4 inches.	Ditto.	Ditto. . . . .
118	F.	50	L.	Years.	2 inches.	Normal.	Dry, scaly, containing crusts of inspissated discharge, which ceased lately.
			R.	. . . .	None.	Ditto.	Coated with a thin discharge. . . .
119	F.	25	R.	1 month.	2 inches.	Normal.	Normal. . . . .
			L.	10 years.	1 inch.	Ditto.	Ditto. . . . .
120	F.	16	R.	6 weeks.	2 inches.	Normal.	Normal. . . . .
			L.	. . . .	4 inches.	Ditto.	Ditto. . . . .
121	F.	12	R.	5 years.	½ inch.	Normal.	Had discharge on three occasions.
			L.	. . . .	6 inches.	Ditto.	Ditto. . . . .
122	F.	30	R.	3 years.	Touching.	Normal.	Dry, devoid of cerumen. . . . .
			L.	. . . .	Ditto.	Ditto.	Ditto. . . . .
123	F.	22	L.	6 years.	4 inches.	Normal.	Normal. . . . .
			R.	. . . .	6 inches.	Ditto.	Ditto. . . . .
124	M.	50	R.	20 years.	None.	Normal.	Impacted with hard cerumen. . . .
125	M.	18	R.	9 years.	None.	Normal.	Dry and scaly; had discharge until two years ago.
			L.	1 year.	14 inches.	Ditto.	Dry, red; no cerumen. . . . .
126	F.	30	L.	10 years.	Touching.	Normal.	Dry; membrane pinkish. . . . .
			R.	. . . .	None.	Ditto.	Dry. . . . .
127	M.	18	L.	2 months.	3 inches.	Normal.	Dry and scaly. . . . .
			R.	. . . .	Touching.	Ditto.	Ditto. . . . .

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
White; much thickened and collapsed.	. . . . .	None.	Tinnitus.	Normal.	. . . .
Ditto.	. . . . .	. . . .	Ditto.	. . . .	. . . .
Invisible.	. . . .	Originally.	Pumping.	Normal.	. . . .
Lower anterior half destroyed, remainder thickened, drawn up with malleus.	Inf.; M. deep red, shining; air causes squeeling sound.	Originally at night.	None.	Normal.	Cold.
Ditto.	Ditto.	. . . .	Ditto.	. . . .	. . . .
Like muffed glass; zone of pinkish vascularity inferiorly; dense white band between point of malleus and anterior edge.	Uninflatable.	None.	Singing.	Normal.	. . . .
Nearly as right, but collapsed, wanting white band.	Ditto.	Ditto.	. . . .	. . . .	. . . .
Lower anterior half destroyed; malleus, with a fragment of thickened membrane, drawn upwards and backwards.	Membrane red, pulpy; shadow thrown by fragment of mem. tym.	None.	Tinnitus, (rare).	Normal.	. . . .
Vascular, opaque; small opening anteriorly.	Membrane villous, red.	Ditto.	. . . .	. . . .	. . . .
Thickened, opaque, mottled with pink.	Inflatable.	On sneezing.	Singing.	. . . .	Cold.
Uniform pink, deepening inferiorly; unpolished.	. . . . .	. . . .	Ditto.	Memb. red, swollen.	. . . .
Opaque, skim-milk colour.	Inflatable.	None.	None.	Normal.	. . . .
Collapsed; dense; red vessels over malleus.	Uninflatable.	Ditto.	Ditto.	. . . .	. . . .
Thickened, opaque, like crumpled parchment.	Uninflatable.	Pain originally.	. . . .	Normal.	. . . .
Unpolished, brownish red, with crescent of vascularity at inferior edge.	Inflatable.	. . . .	. . . .	. . . .	. . . .
Collapsed, opaque, dull; an elevated cicatrix in lower anterior portion.	. . . . .	Great.	Like running water.	Normal.	Blow, followed by hæmorrhage from R. ear.
Slightly opaque, but polished. . .	. . . . .	None.	Ditto.	. . . .	. . . .
Opaque; irregular on surface by number of concavities and convexities.	Uninflatable.	Acute originally.	A ticking.	Normal.	A severe wetting.
White round circumference; a bright, clear spot in centre; its edge well defined.	Inflatable; can press out spot in mem. tym.	. . . .	Ditto.	. . . .	. . . .
Collapsed, opaque, like old parchment; a red streak over malleus.	. . . . .	. . . .	None.	Normal.	. . . .
Collapsed, polished, reflecting light from several small depressions; malleus very prominent, a pinkish hue over site of its attachment.	Uninflatable.	Much formerly.	Tinnitus.	Normal.	. . . .
Opaque, polished, made red by infl.	Inflatable.	. . . .	Ditto.	. . . .	. . . .
Collapsed, skim-milk colour; white band depends from malleus.	Uninflatable.	None.	Boiling water.	Normal.	. . . .
Thickened, mottled with white. . .	Ditto.	None.	Ditto.	. . . .	Parturition.
Pink, mottled with white; light reflected from irregularities on surface.	Inflatable.	On first accession.	Beating originally.	Normal.	. . . .
Highly vascular, but polished. . .	Ditto.	Ditto.	Ditto.	. . . .	. . . .

No. of Case.	Sex.	Age. — Yrs.	Ear affected.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
128	F.	40	L.	2 years.	Normal.	Eczematous.	Scaly eruption extending into meatus.
129	F.	13	R.	6 years.	Touching.	Normal.	Filled by discharge; small polypus from upper wall; lower edge ulcer^{d}.
			L.	. . . .	Ditto.	Ditto.	Coated with discharge and crusts.
130	M.	35	L.	3 months.	4 inches.	Normal.	Dry, shining, vascular.
131	F.	10	R.	6 months.	. . . .	Eczematous from discharge.	Enlarged; filled with ichorous discharge; memb. white and thickened.
132	M.	11	B.	3 years.	Touching.	Normal.	Filled with oily fluid.
133	M.	45	R.	. . . .	3 inches.	Normal.	Normal.
			L.	. . . .	None.	Ditto.	A scale of dark cerumen at bottom.
134	F.	25	R.	18 years.	Touching.	Normal.	Enlarged; covered with discharge; polypus, attached anteriorly.
			L.	. . . .	8 inches.	Ditto.	Dry; had discharge previously.
135	M.	10	L.	4 years.	None.	Normal.	Normal.
			R.	. . . .	1 inch.	Ditto.	Ditto
136	F.	21	R.	17 days.	Touching.	Normal.	Florid red; cuticle peeling.
137	M.	29	R.	Uncertain.	2 inches.	Normal.	Red; cuticle abraded.
138	F.	42	L.	14 days.	Touching.	Flattened by pressure.	Contracted; coated with discharge.
139	M.	45	L.	2 months.	None.	Normal.	Thickened; lining membrane whitish.
140	F.	26	B.	4 years.	2 inches.	Normal.	Normal.
141	F.	30	L.	3 weeks.	1 inch.	Normal.	Normal.
142	F.	20	R.	15 years.	4 inches.	Normal.	Dry; discharge until three years ago.
			L.	Ditto.	6 inches.	Ditto.	Coated by slight discharge.
143	M.	33	R.	8 weeks.	Touching.	Normal; very mobile.	Dry; devoid of cerumen.
			L.	Ditto.	None.	Ditto.	Dry, white, unpolished.
144	M.	30	R.	7 years.	None.	Eczematous.	Normal.
145	F.	21	L.	1 week.	None.	Inflamed.	Cuticle thickened; discharge.
146	M.	50	R.	3 weeks.	1 inch.	Normal.	Filled with cerumen.
			L.	Ditto.	None.	Ditto.	Dry, pink; no cerumen.
147	M.	20	L.	4 years.	None.	Excoriated.	Filled with discharge.
148	M.	50	L.	12 months.	6 inches.	Normal.	White; small exostosis anteriorly.
149	F.	28	R.	8 months.	Touching.	Normal	Thickened; bloody discharge.
			L.	. . . .	4 feet.	Ditto.	Dry; no cerumen.
150	F.	18	R.	3 years.	5 inches.	Normal.	Normal.
			L.	Ditto.	10 inches.	Ditto.	Dry; no cerumen.
151	F.	22	R.	From childhood.	2 inches.	Normal.	Coated with thin discharge, which intermits.
			L.	Ditto.	None.	Ditto.	Dry, crusty.
152	M.	30	R.	5 years.	None.	Normal.	Lining thickened; dry, red.
			L.	Ditto.	Touching.	Ditto.	Filled by purulent discharge.
153	M.	25	L.	3 months.	2 inches.	Normal.	Normal.
154	F.	29	L.	From infancy.	1 foot.	Normal.	Lining pink; polished.
			R.	Ditto.	Ditto.	Ditto.	Ditto.
155	F.	19	R.	10 days.	3 inches.	Normal.	Long and tortuous; dry.
			L.	Uncertain.	2 inches.	Ditto.	Narrow and elliptical.

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
Slightly thickened; white, but polished	Inflatable.	Itching.	None.	Normal.	. . . .
Unseen.	. . . . .	. . . .	None.	Normal.	Scarlatina.
Covered with scaly incrustation. .	. . . .	. . . .	Ditto.	. . . .	. . . .
Flat; an uniform sheet of opacity. .	. . . . .	Originally.	Giddiness.	Normal.	Erysipelas.
White, perforate; air globule reflects light at antero-inferior portion.	Inflat.; water passes through.	. . . .	. . . .	Normal.	. . . .
Thickened, dense, red.	Inflatable.	Originally.	Tinnitus.	Normal.	Influenza.
Opaque, pinkish, vascular.	Inflatable.	None.	Whistling.	Normal.	. . . .
Depressed red spots, probably ulcers.	Inflatable.	None.	None.	. . . .	. . . .
Unseen.	. . . . .	Occasional.	Tinnitus.	Normal.	Scrofula.
Dim; crossed by white band; a depressed spot superiorly.	Uninflatable.	None.	None.	. . . .	. . . .
Much thickened; a large aperture posteriorly.	Promontory presents at aperture.	None.	None.	Normal.	. . . .
Thickened, opaque, vascular. . . .	Uninflatable.	Ditto.	Ditto.	. . . .	. . . .
Dense; red; bulged outwards. . .	Gurgl. sound.	Throbbing.	Hammering.	Normal.	Cold.
A florid red; malleus unseen. . .	. . . . .	Severe.	Ringing.	Normal.	Severe syringing.
Whitish, succulent.	. . . . .	Stinging.	. . . .	Normal.	Cold.
Opaque; streaked with bright red vessels. Facial Paralysis.	Uninflatable.	On first accession.	Buzzing.	Normal.	Cold.
Collapsed; traversed by pearl-coloured band.	. . . . .	. . . .	Ringing.	Normal.	. . . .
Thickened below; bright pink above.	Tymp. cavity uninflatable.	Most severe.	Drumming.	Normal.	Cold.
Granular, like conjunctiva of eyelid.	Uninflatable.	None.	Ticking.	Normal.	Scarlatina.
Fleshy; bulged into meatus; discharge from.	Ditto.	Ditto.	Ditto.	. . . .	. . . .
Collapsed, opaque above, pink below, white behind.	Inflat.; membmade vascular.	None.	Tidal.	Normal.	. . . .
White; yellow deposit in centre. .	Inflatable.	Ditto.	Ditto.	. . . .	. . . .
Normal.	Inflatable.	None.	Like bells.	Normal.	Cold.
Unseen; ruptured.	Inflatable.	Violent.	Throbbing.	Normal.	Cold.
Thickened; red over malleus. . .	Uninflatable.	None.	Steaming.	Normal.	Cold.
Pink, with vesicular projections. .	Inflatable.	Ditto.	Ditto.	. . . .	. . . .
Granular, like ripe raspberry. . .	. . . . .	Slight.	None.	Red.	. . . .
Opalescent; white ring inferiorly. .	Uninflatable.	Rheumatic.	Tidal.	Normal.	. . . .
Three parts removed.	M. granular.	Originally.	Hammering	Normal.	Cold.
Thickened, pearlaceous.	Inflatable.	None.	Singing.	. . . .	. . . .
Pink, mottled with white.	Inflatable.	Occasional.	Buzzing.	Red.	. . . .
Mottled, as in aquo-capsulitis. . .	Ditto.	Ditto.	Ditto.	. . . .	. . . .
One-half destroyed, ossicles and remnant drawn upwards and backwards.	Membrane thickened, red.	None.	None.	Normal.	Small Pox.
Aperture anteriorly; malleus unseen.	Ditto.	Ditto.	Ditto.	. . . .	. . . .
Collapsed; white; malleus projecting.	Uninflatable.	Original.	Musical.	Normal.	Cold.
Collapsed, white, pulpy.	Inflatable.	Ditto.	Ditto.	. . . .	. . . .
Opaque, vascular, with deep-red spot in centre of anterior part.	Inflatable.	Original.	Rustling.	Normal.	Fever.
Large aperture inferiorly.	Memb. villous.	None.	Boiling.	Normal.	. . . .
Ditto.	E. tube closed.	Ditto.	Ditto.	. . . .	. . . .
A uniform pink.	Inflatable.	Severe.	Buzzing.	Normal.	Cold.
Collapsed, highly vascular. . . .	Uninflatable.	None.	Ditto.	. . . .	. . . .

No. of Case.	Sex.	Age. — Yrs.	Ear affected.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
156	F.	19	L.	4 years.	6 inches.	Normal.	Contracted; thickened; discharge.
157	F.	14	L.	11 years.	None.	Normal.	Filled completely with large polypus, which projects externally.
158	F.	22	R.	2 years.	Touching.	Normal.	Brown-red, dry.
			L.	Ditto.	2 inches.	Ditto.	Dry, scaly, pink.
159	F.	24	R.	1 year.	1 inch.	Red, scaly.	Contracted; whitish discharge.
160	F.	20	R.	10 years.	None.	Normal.	Normal; never had discharge.
			L.	9 years.	Ditto.	Ditto.	Ditto.
161	F.	6	L.	2 years.	1 inch.	Normal.	Normal.
162	M.	25	B.	4 months.	None.	Normal.	Dry.
163	F.	35	R.	4 days.	None.	Normal.	Filled with pus and air bubbles.
			L.	. . . .	3 inches.	Ditto.	Contains thin muco-purulent discharge.
164	M.	31	L.	1 year.	4 inches.	Normal.	No cerumen; pinkish.
			R.	. . . .	2 inches.	Ditto.	Normal.
165	M.	35	B.	9 months.	None.	Lumpy, from a contusion.	Normal.
166	M.	20	R.	14 years.	Touching.	Normal.	Very red; had discharge originally.
			L.	. . . .	3 inches.	Ditto.	Dry and polished.
167	M.	8	R.	4 days.	None.	Swollen, red, and painful.	Swollen; coated with lymph and muco-purulent discharge; filled by a grain of Indian corn.
168	M.	38	R.	15 years.	1 inch.	Normal.	Dry; no cerumen.
			L.	. . . .	1 foot.	Ditto.	Osseous encroachment posteriorly; discharge originally.
169	F.	16	R.	10 years.	None.	Normal.	Dry; no cerumen; previous discharge.
			L.	. . . .	1 inch.	Ditto.	Filled with discharge and air globules.
170	M.	13	R.	7 years.	Touching.	Normal.	Dry, scaly.
			L.	. . . .	None.	Ditto.	Filled with discharge.
171	M.	40	R.	6 months.	2 inches.	Helix wanting; purple.	Enlarged; smeared with discharge.
			L.	. . . .	4 inches.	Normal.	Dry, with membrane corrugated.
172	M.	7	R.	4 years.	2 inches.	Normal.	Dry; no cerumen.
173	F.	22	R.	6 months.	2 feet.	Ditto.	Filled by several small abscesses.
174	F.	30	R.	4 months.	None.	Erysipelatous; mastoid region enlarged.	Contracted; filled with crusts; granular inferiorly; a thin scale of bone projecting.
175	M.	8	L.	2 years.	Touching.	Normal.	Filled by discharge and air globules.
			R.	. . . .	1 inch.	Ditto.	Filled with scales and cerumen.
176	F.	25	R.	1 year.	2 inches.	Irregular; no lobe	Filled with cerumen.
			L.	. . . .	1 inch.	Normal.	Normal.
177	F.	15	B.	5 years.	2 inches.	Normal.	Sanious discharge from.
178	M.	9	B.	3 weeks.	Touching.	Normal.	Filled with scales and cerumen.

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
Unseen.	. . . . .	None.	None.	Normal.	. . . .
Unseen.	. . . . .	None.	Tidal.	. . . .	. . . .
Thickened, opaque, polished. . . .	Uninflatable.	None.	None.	Normal.	Cold.
Opaque, mottled, polished.	Inflatable.	Ditto.	Ditto.	. . . .	. . . .
Unseen.	. . . . .	Soreness.	None.	Normal.	. . . .
Dense white; thickened; clear, depressed spots behind malleus, and opposite to Eustachian tube.	Inflatable in pockets.	None.	Blowing and singing.	Normal.	Scrofula and spine disease.
Flat; skimmed-milk colour, with clear dimple inferiorly.	Uninflatable.	Ditto.	Ditto.	. . . .	. . . .
An uniform pink.	. . . . .	Pain.	Singing.	Normal.	. . . .
Flat; slightly opalescent.	Inflatable.	None.	Confused.	Normal.	Fever.
Mottled; a pulsating rent anteriorly.	Uninflatable.	Intense.	Reports.	Red.	Cold.
Thickened, opaque, vascular above.	. . . . .	. . . .	. . . .	. . . .	. . . .
Much collapsed, opaque; malleus projecting; irregular; white spots; clear patch anteriorly.	Uninflatable; malleus red.	Occasional.	Buzzing.	Normal.	. . . .
Collapsed; white below, red above.	Ditto.	. . . .	Ditto.	. . . .	. . . .
Thickened, opaque, like old parchment; vascular above.	. . . . .	Originally.	Buzzing.	. . . .	Injury.
Collapsed; a dense purple red, but polished; malleus prominent.	Uninflatable.	. . . .	Tinnitus.	Normal.	. . . .
Thickened; small aperture inferiorly.	Ditto.	. . . .	None.	. . . .	Typhus.
On removal of foreign body, membrana tympani found coated with adhesive lymph.	. . . . .	Intense.	Buzzing.	Normal.	Foreign body.
Crescentic opacity inferiorly; and clear, thin concavity posteriorly.	Inflatable.	None.	Running water.	Normal.	Diving.
Collapsed, opaque; irregular, clear depression posteriorly.	Ditto.	Ditto.	Ditto.	Ditto.	. . . .
Collapsed, thickened, opaque; granular in centre.	. . . . .	None.	Tinnitus.	. . . .	Scarlatina.
Vascular; perforate opposite Eustachian opening.	Inflatable.	. . . .	. . . .	Normal.	. . . .
Much thickened; orange red inferiorly; malleus indiscernible; white streak crossing lower part.	. . . . .	None.	Sawing.	Normal.	Stupidity.
Thickened, opaque, vascular. . . .	. . . . .	Occasional.	. . . .	Ditto.	. . . .
Rose-coloured, rugged, granular. .	Uninflatable.	None.	Tidal.	Normal.	. . . .
Skimmed-milk colour; white crescent inferiorly.	Inflatable.	Ditto.	Ditto.	. . . .	. . . .
Rose-coloured, polished.	. . . . .	Originally at night.	. . . .	Normal.	Cold.
Undiscernible.	. . . . .	Originally.	. . . .	Normal.	. . . .
A florid red.	Uninflatable.	Originally.	Tinnitus.	Normal.	A blow.
Red and white; perforate posteriorly.	. . . . .	None.	None.	Memb. red.	. . . .
Irregular, corrugated, with clear spots.	. . . . .	. . . .	. . . .	. . . .	. . . .
Skimmed-milk colour; spotted with white; red over malleus.	Inflatable; M. T. reddened.	None.	Tidal.	Normal.	Cold.
Crescentic opacity below; white band across.	Ditto.	Ditto.	Ditto.	. . . .	. . . .
Perforate posteriorly.	Inflatable.	. . . .	Tidal.	. . . .	. . . .
Rose-coloured; mottled with white.	. . . . .	. . . .	. . . .	Tonsils enlarged.	Cold.

No. of Case.	Sex.	Age — Yrs.	Ear affected.	Duration of Disease.	Hearing Distance.	State of Auricle.	State of External Meatus and Canal.
179	M.	25	L.	2 months.	Touching.	Normal.	Collapsed to mere slit; covered with discharge; epithelium abraded.
			R.	. . . .	1 inch.	Ditto.	Pinkish, dry.
180	F.	20	L.	7 months.	None.	Normal.	Dry, scaly.
			R.	. . . .	Touching.	Ditto.	Scaly; cuticle thickened.
181	M.	26	R.	1 month.	Touching.	Normal.	Normal.
182	M.	40	L.	2 months.	Variable.	Normal.	Filled by hard, dark cerumen.
183	F	13	L.	10 years.	None.	Normal.	Filled by thick, yellow discharge.
184	F.	17	R.	9 years.	Touching.	Irregular.	Widened; filled with crusts.
			L.	Ditto.	1 inch.	Normal.	Filled by discharge and air bubbles.
185	M.	24	R.	5 years.	None.	Normal.	Filled with discharge.
			L.	Ditto.	1 inch.	Ditto.	Normal.
186	F.	40	R.	3 months.	4 inches.	Normal.	Sides collapsed, thickened.
			L.	. . . .	1 foot.	No helix.	Ditto.
187	M.	22	R.	2 months.	None.	Normal.	Enlarged; pink; its bottom filled with discharge and air globules.
			L.	Ditto.	Ditto.	Ditto.	Ditto.
188	M.	50	B.	2 years.	None.	Normal.	Normal.
189	M.	25	R.	1 year.	None.	Normal.	Normal.
			L.	. . . .	Ditto.	Irregular.	Dry; no cerumen.
190	M.	10	R.	6 years.	Touching.	Normal; mastoid gland enlarged.	Normal.
			L.	Ditto.	8 inches.	Normal.	Normal.
191	M	30	R.	4 years.	None.	Normal.	Red, dry, and scaly.
			L.	Ditto.	Ditto.	Ditto.	Ditto.
192	F.	50	B.	12 years.	9 inches.	Flattened.	A mere slit; edges in contact.
193	M.	40	R.	10 years.	Touching.	Normal.	Normal.
194	F.	60	L.	25 years.	Pressing.	Normal.	Dry, scaly; introduction of speculum induces spasmodic coughing.
			R.	4 years.	Touching.	Ditto.	Ditto.
195	M.	31	L.	6 years.	None.	Normal.	Wrinkled; some cerumen.
			R.	4 years.	Touching.	Ditto.	Filled by discharge; small polypus attached immediately in front of membrana tympani.
196	M.	40	L.	10 years.	None.	Normal.	Normal.
			R.	Ditto.	Ditto.	Ditto.	Filled with cerumen.
197	M.	14	L.	12 years.	4 inches.	Normal.	Normal.
			R.	Ditto.	1 inch.	Ditto.	Excoriated with discharge; air bubbles and polypus.
198	M.	17	L.	10 years.	9 inches.	Helix deficient.	Filled with fœtid discharge and polypus.
			R.	Ditto.	Touching.	Normal.	Excoriated and filled with very fœtid discharge; polypus attached posteriorly.
199	F.	20	R.	5 years.	Touching.	No lobe.	Dry and scaly.
			L.	6 months.	1 foot.	Ditto.	Ditto.
200	M.	19	R.	3 years.	4 inches.	Normal.	Filled with cerumen and foreign substances.

State of Membrana Tympani.	Middle Ear and Eustachian Tube.	Pain.	Noise.	State of Throat.	Disease attributed to
Sloughy; an ash-grey colour. . .	Inflatable.	Severe.	Like wind.	. . . .	Cold.
Collapsed, thickened, and opaque. .	. . . . .	. . . .	Ditto.	. . . .	Ditto.
Slightly opaque; whitish below. .	Inflatable.	None.	Tidal.	Normal.	Cold.
Opaque below, pink above. . . .	. . . . .	. . . .	. . . .	. . . .	. . . .
Florid red; malleus unseen; Facial paralysis on left side.	Uninflatable.	Severe at night.	Tinnitus.	Normal.	Cold and exposure.
White; ext. layer removed with wax.	. . . . .	None.	Like wind.	Normal.	. . . .
Vascular; perforate inferiorly. . .	Inflatable.	None.	None.	Normal.	. . . .
Thickened; pulsating aperture below.	Villous.	None.	Like mill.	Memb. red.	. . . .
Nearly removed.	Very red.	None.	None.	. . . .	. . . .
Deficient posteriorly.	Memb. white.	Originally.	None.	Normal.	. . . .
Pearly, streaked with red.	Inflatable.	None.	None.	. . . .	. . . .
Collapsed, thickened; malleus red.	Uninflatable.	Originally.	Tinnitus.	Normal.	Cold.
Opaque and thickened.	Ditto.	None.	Ditto.	. . . .	. . . .
Mottled red and white; small aperture opposite Eustachian opening, which emits a whistling sound.	Inflatable.	None.	Whizzing.	Normal.	Cold.
Ditto.	Ditto.		Boiling.	. . . .	. . . .
Perfectly normal.	Inflatable.	In head.	Buzzing.	Normal.	Intemper^{e}.
Collapsed, like crumpled parchment.	Uninflatable.	Intense.	Confused.	Ulcerated.	Syphilis.
Collapsed; opaque crescent inferiorly.	Ditto.	Ditto.	Ditto.	. . . .	. . . .
Irregularly polished; pink zone inferiorly.	Uninflatable.	Pain for two months.	None.	Normal.	Measles.
Slightly opaque, but polished. . .	Ditto.	None.	None.	. . . .	. . . .
Collapsed; bright pink over malleus.	Uninflatable.	None.	Fizzing.	Tonsils enlarged.	Cold.
Much collapsed; pink above. . . .	Ditto.	Ditto.	Ditto.	. . . .	. . . .
Thickened, opaque, vascular. . . .	Uninflatable.	None.	Rasping.	Normal.	. . . .
Opaque, except one clear spot anteriorly.	Inflatable.	None.	Tidal.	Normal.	. . . .
Thickened, opaque, like parchment; opacity deepens at inferior edge, and over malleus.	Inflatable; malleus becomes vascular.	None.	Tidal.	Normal.	Parturition.
Collapsed, thickened; a triangular, clear spot below malleus.	Uninflatable.	Ditto.	Ditto.	. . . .	. . . .
Collapsed, thickened, opaque. . . .	Uninflatable.	None.	Hushing.	Normal.	Cold.
Opalescent; small aperture in centre.	Inflatable.	None.	Ditto.	. . . .	. . . .
Collapsed, polished; malleus prominent, clear in middle; crescent of opacity in front.	Inflatable.	None.	Tidal, roaring.	Normal.	Wearing a wet cap.
Uniformly thickened; white crescent inferiorly.	Ditto.	Ditto.	Ditto.	Ditto.	. . . .
Opalescent.	Uninflatable.	Occasional.	Ringing.	Normal.	Fall on head.
Perforate anteriorly.	Inflatable.	None.	. . . .	. . . .	. . . .
Unseen.	. . . . .	. . . .	. . . .	. . . .	Measles.
Ditto.	. . . . .	. . . .	. . . .	Normal.	. . . .
Thickened and much collapsed. . .	Uninflatable.	None.	Crackling.	Normal.	Typhus.
Bands of opacity, with clear space between, reflecting light over large surface, but decreased, and membrane bulged outward on inflation.	M. inflatable in clear spot.	Ditto.	Ditto.	Ditto.	Ditto.
Thickened, collapsed, vascular. . .	Uninflatable.	Originally.	Buzzing.	Normal.	Fractured cranium.

Sex and Age.—From an examination of the foregoing Registry, we learn that of the two hundred persons affected, 101 were males, and 99 females ; their ages being in the following proportions:—Under five years, 4 ; from five to ten inclusive, 19 ; from ten to twenty, 63; twenty to forty, 82 ; forty to sixty, 29 ; and above that age, 3.

Ear affected.—In 27 instances both ears were similarly and nearly equally affected, in which case a single entry opposite the letter B was deemed sufficient. In 100 instances both ears were diseased, but the duration, hearing distance, morbid appearances, and, in some cases, the cause, varied considerably on each side. Generally speaking, the ear most seriously affected is that first noted. In 35, the right, and in 38, the left ears alone were affected. Where the record of but one ear is inserted, the other was normal. In all cases the entry was made when the patient first applied at the Institution; the progress and subsequent appearances, increased by the advances of disease, or modified by treatment, have not been taken into account—the object being to record the exact state in which each case of a given number, taken without selection, presented.

It must be remembered that all these cases were taken down at length by a short-hand writer, and that the condition of the meatus and the state of the membrana tympani, as seen through the speculum, were the two principal objects attended to. In cases of manifest disease of the external ear, or upon the surface of the membrana tympani,—sufficient to account for the symptoms presented,—an examination of the state of the tympanal cavity was seldom made. The blanks in some columns show that the symptoms or appearances to which that particular space is devoted were not, in those instances, present, or that the statement of the patient on that point was unsatisfactory. I have lately had a form of registry printed for the Hospital, containing, in addition to the foregoing, columns for the date, definition of affection, treatment, and observations, &c.,—the tabulated results of which will, I trust, in time, still further assist the examination and diagnosis of aural affections.

Dr. Kramer, in his review of my writings in the last edition of his large work on the Ear, says that I have been illogical in my

deductions; this may, possibly, be the case, but I believe it will be acknowledged that, in medical science, one well-established fact, and truthful observation, is worth a hundred syllogistically arranged arguments.

Duration of Disease.—The duration of the disease, as well as the hearing distance, is difficult to tabulate, owing to the variation in those cases where both ears were affected. In some instances the patients gave such an unsatisfactory account of their disease, that the most which could be gleaned was, that they had been "deaf for years." As a general result, the following particulars flow from this portion of the examination:—In 27 persons, the disease was within one month's duration; in 40, from one to six months; in 17, from six to twelve; 45 persons were affected from one to five years; 29 from five to ten; and 34 over that period. In the analysis of this column the duration is given from the ear longest affected.

The hearing distance observed may be thus classified:—70 could not hear the watch under any circumstances; 4 heard on its being pressed against the auricle; 61, on merely touching that part; 125, within six inches; 22, from that distance to three feet and upwards; and in 18 the hearing distance was either normal or unrecorded.

The auricle was healthy in 264 instances; presented congenital peculiarities in 10; and was diseased in 26.

The state of the meatus and external auditory canal may be thus defined:—Normal in 68; dry and devoid of cerumen, with the membrane whiter than natural, and slightly wrinkled, or presenting towards its outward margin a few dry scales,—characteristics of disease in the neighbouring structures and general accompaniments of deafness,—78. It was coated with discharge, the lining thickened, and frequently of a pink colour or vascular, or the passage filled with crusts of inspissated mucus from previous discharge, in 83 instances; and of these cases, 18 had polypi growing from some portion of the canal. In 25 cases the passage was filled with cerumen of different qualities and degrees of consistence; these, however, form no proportion of the cases of deafness arising from simple impaction with cerumen which occurred dur-

ing the period when the foregoing 200 cases were recorded, but are inserted in the Registry on account of other abnormal conditions which presented, both as regards the pathological appearance of the membrana tympani, or the middle ear, on the removal of the offending body. In 26 cases the canal was inflamed; in 9 its walls were so much thickened or approximated, as to give the external auditory aperture the appearance of a mere slit; bony growths presented in 4 instances; and a few cases occurred of condylomata and other protuberances filling up the meatus; 4 cases of congenital peculiarities, as regards the length, width, and tortuosity of this canal, also presented, as may be learned by an examination of the cases in detail. In order to economize space, much contraction was obliged to be used in the terms employed for recording the state both of the external meatus and the membrana tympani.

The state of the membrana tympani is the most valuable result afforded by the examination of these cases. In 10 instances only was it found natural, so that such may fairly be stated as the proportion of cases of "nervous deafness." In 176 it was thickened and opaque, in whole or in part, from disease of its external layer, owing to inflammations of various kinds—with and without otorrhœa, pressure, or ulceration—from deposits of lymph between its laminæ, or from thickening or vascularity of its mucous lining. These opacities varied as much in shade as the same forms of disease present in the cornea—from a slight nebula to that of a dense white leucoma ; and the analogy between the diseases of these two structures, the cornea and membrana tympani, can only be appreciated by those conversant with both. Sometimes it presented a slight opalescence, or skimmed-milk hue ; at others, a general dense opacity, and in these cases the membrane was most frequently collapsed. In some cases the opacity presented a mottled appearance, like that seen on the back of the cornea in aquo-capsulitis; in others it appeared like mother-of-pearl. The most frequent site of isolated dense opacity was the inferior attachment of the membrane, where it presented a crescentic white band, about a line in breadth, and somewhat resembling the arcus senilis. In a few instances a dense white line stretched between

the extremity of the malleus and some point of the circumference of the membrane. Around the attachment of the malleus it was frequently thickened and opaque. In many cases there was a yellowish tint imparted to the membrane, which gave it somewhat the appearance of old or crumpled parchment.

In 13 cases there were connected with these various states of opacity thin clear spots of membrane, about the size of mustard-seeds, which, when air was pressed into the cavity, generally bulged outwards into small pouches ; and this phenomenon occurred even in instances in which the membrane as a whole did not appear to be affected by the volume of air. It is not improbable that these were the sites of ulcers in which the external layer, or the internal mucous one, had been removed, and the middle fibrous structure remaining unaffected was thus pressed outwards into small herniæ. Occasionally the whole surface of the membrane was irregular.

The amount of polish was various: in many cases the surface of the membrane resembled muffed glass ; in others, although there was considerable opacity, the normal shining character was preserved, and light reflected in the usual manner. It is possible that in these latter cases the opacity may have been seated in the mucous layer lining its inner surface.

There was facial paralysis in 4 instances.

In 4 cases there was a deposit of hard, gritty matter, between the laminæ of the membrane, of a yellowish colour, with a sharp, defined edge, like the atheromatous substance formed between the coats of arteries.

It is not, in the present condition of our knowledge, always possible to state what was the precise form of inflammation or other disease which produced the effects particularized in the foregoing Registry, which merely records the appearance at the moment, and the pathological results of previous disease.

In 121 cases the membrane was more or less vascular; sometimes it presented a uniform pinkish hue, deepening in colour from that of a monthly rose-leaf to that of a bright blood-red or scarlet, as when affected with recent inflammation. Occasionally the redness was circumscribed, presenting a zone around the in-

ferior attachment of the membrane, not unlike that seen in cases of corneitis; in others, showing several small dots, or brightening the site of the attachment of the malleus. In noting the cases, a distinction was made between tints of colour and vascularity; in the latter the red vessels were distinct and plainly discernible. Where the naturally-thickened membrane shelves off gradually into the roof of the meatus is a very common locality for redness and vascularity, even in otherwise healthy membranes. Where distinct vessels could be traced, they were generally observable in that position, or coursing from above downwards along the manubrium, or spreading from the point of that bone to the posterior or inferior attachment of the membrane. In some instances the whole surface was not only of a deep red, but also granular, like that of a ripe raspberry, or the appearance so frequently presented on the inside of the upper eyelid;—such were cases of long-continued otorrhœa. Although this carneous condition was often seen, and although so many cases of otorrhœa and polypus occurred, I have never observed a polypus growing from the external surface of the membrana tympani, either in these 200 cases, or in the many hundred ears that I have examined. The general red colour, as well as the distinct vascularity, was always increased by any attempt made by the patient, whether successful or not, to force air into the tympanal cavity. That blood is decidedly pressed into the structures of the ear by a forced expiration, or inflation after the manner described at page 64 I had very recently an opportunity of determining. I removed a polypus attached by a fine peduncle to the anterior wall of the meatus, near the attachment of the membrana tympani; nothing remained of it but the bright-red spot from which the morbid structure grew. After the hæmorrhage ceased, and when the parts were brought into the field of the speculum, I desired the patient to inflate the drum, when I remarked that each time he did so, the blood pumped out of the spot from which the polypus had been cut.

In 53 cases the membrana tympani was more or less collapsed, a condition already referred to at page 14, and the cause of which would, from the dissections of both Mr. Swan and Mr. Toynbee, appear to be adhesions passing through the cavitas tympani,

either between the mucous surface of the membrane itself, or the ossicula connecting it with the inner wall of that cavity, and thereby limiting their and its motions. In the majority of these instances, neither by natural nor artificial means could the vibrating portion of the membrane be pressed outwards, although in some of these cases there was positive proof, by catheterism and the air-pump, that the Eustachian tubes were free. As might naturally be expected where the membrane was drawn so much inwards, either by the mechanical causes alluded to, or from pressure of the external atmosphere where the Eustachian tubes were not free, the malleus projected outwards, considerably beyond the line of the membrane, which dipped from it, like a festoon, on either side. The great bulk of these cases of collapsed membrane also showed evidences of thickening and opacity. The membrane was perforated in 48 cases, the size and position of the aperture presenting great variety. In most, but not all of these, the air passed through with a whistling, squeeling, bubbling, or gurgling sound,—each peculiar tone being, no doubt, produced by the size, position, and valvular character of the aperture, as well as the fluids through which the stream of air passed, and possibly also by the condition of the margin of the hole, which was sometimes thickened, and frequently inverted. In 25, the perforation existed inferiorly or anteriorly, opposite the opening of the Eustachian tube ; in 10, posteriorly ; and in 13 the great bulk of the membrane was removed ; and the remnant, with the ossicles, was drawn upwards and backwards, while the cavity of the tympanum, and the promontory in particular, was distinctly visible, with its lining membrane red and villous. In 22 instances the membrana tympani was, from obstructions in the canal, unseen.

The state of the middle ear and Eustachian tube is not so satisfactorily recorded as that of either of the foregoing subjects, as it is not possible to diagnose with accuracy the pathological condition of this unseen cavity. Where manifest disease showed in the membrana tympani, or where that structure was open—with muco-purulent matter pumping through it—it may be fairly supposed that the fine mucous lining of the cavitas tympani could not have been in a perfectly healthy condition. Where the aper-

ture in the membrana tympani was sufficiently large to admit of inspection of the parts beyond, their condition is generally stated in the tenth column of the Registry. The cavity was exposed in 28 ears ; in 89 there is no record of its state ; in 129 it was inflatable, and in 73 uninflatable,—the mode of examination being, in most instances, that described at page 64. In many instances, particularly those in the latter portion of the Registry, an exploration was made by means of the Eustachian catheter and air-press.

Pain.—The statement given on this point must, particularly in cases of long standing, be received with caution. In 115 instances the patients had experienced pain, either in one or both ears, at some particular period of the disease. In 124 cases they stated that they had never had pain ; and in 61, the notes from which this Registry has been compiled make no statement upon the subject.

Noise.—In 182 cases there was tinnitus; in 58, none; and in 60 there is no record. What I have already written upon the subject, at page 82, may serve as an explanation for the summary of this symptom.

The state of throat was normal in 181 cases out of the 200, a fact which goes far to disprove all that has been written upon what has been termed "throat deafness;" but then it is only fair to state, that enlarged tonsils are rare among the lower orders.

The disease was attributed to cold, or variations of temperature, by sitting opposite a broken window, or being exposed to a draft of air in a railway-carriage, &c., in 63 cases; to scarlatina, in 14; fever, 8 ; measles, 3 ; influenza, 3; scrofula, 4; syphilis, 2; and bathing in the sea, 5 ; injury or accident, 11 ; occurred after parturition, 3; followed erysipelas, 2; small-pox, 1 ; intemperance, 1 ; and in the remainder, the patients were unable satisfactorily to account for the accession of disease. It must, however, be borne in mind that the persons from whom these accounts were received belong to a class that pay but little attention to the early symptoms of deafness, and that in very many the disease approached gradually and without warning. In children and young persons the first symptoms of deafness are, unless accompanied by pain or

discharge, generally unattended to, or are attributed by the friends to inattention or stupidity.

From the records of the foregoing 200 cases, taken indiscriminately as they presented at a public institution, as well as Mr. Toynbee's dissections already detailed, it is incontrovertibly manifest that inflammatory affections of some form or other have been the chief cause of aural diseases. This conclusion must, I think, be conceded; and it is of vast importance that the Profession should be convinced on that point, as, on the one hand, it shows not only the inapplicability of the various nostrums still in use for "deafness," while, on the other, it holds out a fair hope of alleviating diseases of the ear, if taken in time, by the ordinary means in use for arresting inflammation of the structures engaged.

That a large proportion of diseases of the ear depend upon constitutional taint, and are of a strumous character, is well known to most medical practitioners. In some of Mr. Toynbee's dissections the diseases of which the patients died have been recorded. The deaths of 52 were attributed to diseases of the lungs, of which 39 were from consumption. Epidemic diseases carried off 24, of which 16 were by fever. In 18 the deaths were caused by diseases of the brain or nervous system, and 15 died from diseases of the digestive organs.

Those only who have been engaged in accurately recording cases, and compiling statistics therefrom, can well understand or appreciate the labour necessary to effect the objects intended. In concluding this portion of my work I would earnestly entreat those gentlemen connected with public institutions where diseases of the ear are treated, to introduce some form of registry by which a record may be preserved of the physical signs exhibited in cases of deafness; and occasionally to make known the results.

Having now, in accordance with the plan laid down for the arrangement of this work, given some account of the principal writings and discoveries connected with aural surgery; having entered fully into the best method of examination, in order that an accurate diagnosis might be formed; and having also discussed the subject of the statistics of ear diseases, it only remains, before I enter upon their description and treatment in detail,

to offer some remarks upon the best nosological arrangement of these affections.

To the difficulties attending all synoptical arrangements, we have here to encounter additional ones, arising from the obscurity of the parts affected: and, whether we attempt a classification according to the symptoms, as the means employed by Cullen and Mason Good,—or base it upon the normal or morbid anatomy of the tissues affected, as by our modern nosologists, the same difficulties beset us.

The earliest chart of aural diseases worth mentioning is that arranged by Galen. It consists of five affections, viz.: *otalgia*, *baruckoia*, *kophotis*, *parakousis*, and *parakousmata ;* but these, it is perfectly evident, were but symptoms, not diseases; and to these he added, pain in the ear from cold, inflammation, and "*ex flatulento spiritu aut crassis et viscosis humoribus est ex serosis et saniosis humoribus.*"

The first attempt at an arranged nomenclature of aural diseases in Great Britain was that by Buchanan in 1825, who, in his "Illustrations of Acoustic Surgery," endeavoured to classify those affections according to the parts engaged; but his diseases are mere symptoms. It contains three orders, twelve genera, and thirty-three varieties ; that, however, his division is most imperfect, nay, in some respects, absurd, may be learned by an examition of his fourth genus alone, styled, "*Impedimentum Externum*," or obstruction of the external meatus, under which he enumerates four species, each resulting from causes totally different, and quite unconnected with one another, viz.: "*Impedimentum Extraneum*, from extraneous substances; *Impedimentum Induratum*, from indurated wax ; *Impedimentum Polyposum*, from polypi ; and *Impedimentum Excrescens*, from excrescences"!!

At page 35 I alluded to Mr. Harvey's "Synopsis of the Diseases of the Human Ear," published some years ago, and offered an opinion as to its value and peculiarities. As a further example, we find in Class II. (*quære* III.), Order 1. Laburinthos—a variety of diseases:—Inflammations, ulcerations, perforations, excrescences, concretions, hydatids, effusions of blood, formations of pus, &c., &c. affecting the labyrinth, and also the fluid of that

cavity, but expressed in high-sounding, Greek-derived terms, for which, as special diseases, there is no warrant that I am aware of. It is high time to get rid of such attempts, which merely mystify the student, and serve to frighten the patient. If we want complexity of nomenclature in diseases of the ear we had better apply to the Chinese or the Hindus.*

The anatomical division into the external, middle, and internal ear, presents a natural basis for classification, and such was the method adopted by Du Verney. Deleau's Table is perhaps the most artificial, and at the same time incomplete; he gives five classes, two of which are devoted to affections of the Eustachian tube: the first is divided into two orders, for the alterations produced in its naso-guttural orifice by pharyngeal disease, one by chronic inflammation, the other from enlarged tonsils,—an idea that has been much enlarged and improved upon in England, although I have not yet heard of a single dissection showing that an indurated tonsil in any way pressed upon or produced an alteration in the trumpet-mouth of that canal. The second class contains three orders, consisting of simple obstruction, chronic inflammation, and stricture of the upper portion of the tube, not produced by disease in the pharynx, but all arranged to meet the author's peculiar views with respect to Eustachian catheterism and aural auscultation. His third class consists of inflammation without secretion, and muculent accumulation in the cavity of the tympanum; the fourth includes inflammation and perforation of the membrana tympani; and the fifth is devoted to complications attending diseases of the middle ear, the first and second orders of which are simply combinations of the foregoing; and the third order includes diseases of the middle ear and labyrinth.

In the two first editions of his work on Diseases of the Ear, Kramer adopted the original division of Du Verney, but mingled the anatomical and pathological basis in the subdivision of the diseases of these parts; as for instance, erysipelatous and phlegmonous inflammations, and also inflammations of the glandular,

* See Commentary on the Hindu System of Medicine, by T. A. Wise, M. D., Calcutta, 1845, page 287.

cellular, and periosteal structures. In the last edition of his work he adheres throughout to the anatomical basis, as, for instance, inflammation of the cuticle, the cutis, the cellular membrane, mucous tissue, and periosteum, &c.

Mr. Wharton Jones's arrangement is entirely an anatomical one, consisting of two parts, viz.: the diseases of the accessory organs of the apparatus of hearing,—and the diseases of the fundamental organ of hearing,—the ear-bulb, or labyrinth,—with the minute subdivisions of both these portions.

Mr. Williams does not attempt any classification whatever; and Mr. Pilcher's work is likewise defective in this respect, his arrangement being a simple enumeration of aural affections, divided into—the abnormal conditions or malformations; otitis, or acute inflammation; chronic diseases of the ear; and nervous diseases of the ear.

Lincke is by far the best modern classifier: he makes three divisions; but he does not classify the diseases of the sentient portion of the auditory apparatus, or those producing nervous deafness. We hope to see a third volume from this author on these obscure forms of disease. In the first division we find—

INFLAMMATIONS OF THE ORGANS OF HEARING.

Sec. I.—*Simple.*	Sec. II.—*Complicated and Specific.*
Outer Ear.—Attritus Auriculæ.	Otitis, Erysipelatosa.
Erythema Auriculæ.	,, Catarrhalis.
Inflammatio Auriculæ Phlegmonosa.	,, Gonorrhoica.
Pernio Auriculæ, a frigore.	,, Rheumatica.
Inflammatio Meatus Auditorii.	,, Arthritica, s. Otagra.
Inflammatio Membrana Tympani (Myringitis).	,, Scrophulosa.
Middle Ear.—Otitis Universalis s. totalis interna.	,, Syphilitica.
Inflammatio Tubæ Eustachianæ (Syringitis).	,, Morbillosa.
	,, Scarlatinosa.
	,, Variolosa.
	,, Eczematica s. Crusta Lactea.
	,, Herpetica.

His second division includes—

AFFECTIONS CAUSED BY SOLUTIONS OF CONTINUITY.

Contusio Auriculæ.
Vulnera Auriculæ.
Fractura Auriculæ.
Vulnera Membrana Tympani.
Vulnera Totalis Auris.
Coloboma Auriculæ.
Foramina Membranæ Tympani.

The third division consists of—

AFFECTIONS CAUSED BY COHESION OF PARTS.

Dilatatio Meatus Auditorii.
Strictura Meatus Auditorii.
Compressio s. Thlipsis Meatus Auditorii.
Collapsus Meatus Auditorii.
Atresia s. Obliteratio Meatus Auditorii.
Dilatatio tubæ Eustachii.
Strictura tubæ Eustachii.
Obturatio tubæ Eustachii.
Collapsus tubæ Eustachii.
Obliteratio tubæ Eustachii.
Imperforatio tubæ Eustachii.
Aneurisma et Varix Auriculæ.
Cirsomyringa.*

I was indebted to this enumeration of Lincke's for the first account of some of the diseases I introduced into the original edition of the accompanying Nosological Table.

In Part II. of my Contributions to Aural Surgery, published in 1844, I gave a Nosological Chart of Diseases of the Ear, "more for the purpose of eliciting inquiry, and as a basis for future investigations, than as possessing any great merit of its own." The general principles upon which that arrangement was based I still adhere to, viz.—the primary divisions into the diseases of the auricle and external ear, with the mastoid and pre-auricular regions—in fact, all the parts visible to the unassisted eye, or which can be appreciated by the touch;—those of the external meatus and auditory canal; the affections of the membrana tympani; those of the middle ear, or cavity of the tympanum; the morbid conditions of the Eustachian tube; and lastly, the diseases of the internal ear, so far as they have been recorded by

* Handbuch der theoretischen und practischen Ohrenheilkunde,—von Dr. Carl Gustav Lincke. Zweiter Band. Die Nosologie und Therapie der Ohrenkrankheiten. Leipzig, 1840. Referred to at page 30.

authors or have passed under my own observations. While, however, this anatomical division serves as a basis for the orders, and, to a certain degree, influences the division into genera, in accordance with the structure affected, it is not possible, consistently with the phenomena of disease, to carry it beyond that point, and therefore the species and varieties of diseases and accidents are not confined to particular structures, but are classified according to their symptoms and the other peculiarities of the affections themselves. As it is not possible to limit disease, especially of an inflammatory character, to any particular structure, so is it impossible to carry the anatomical division beyond a certain extent.

In this classification I have inserted most of the congenital malformations and a few rare diseases, upon the authority of credible authors, but with these exceptions the rest have passed under my own observation. I have also reduced the nomenclature as far as possible to English. The chief alteration in the present arrangement consists of the position given to the various affections producing discharge from the meatus, and known under the term Otorrhœa, which I have distributed according to the original locality or structure affected; but owing to the great importance of this symptom, its frequency in these countries, the variety of morbid products, even in remote structures, which it may produce, and the fatal results which sometimes attend it, I have devoted a separate chapter to its consideration. The number of inflammations which may give rise to, and the variety of structures from which, discharges from the ear may proceed, either originally or by subsequent extension, prove the impossibility of retaining the anatomical division beyond a certain point. There are some diseases in the accompanying table which belong as much to one division as another, for instance, those of the membrana tympani; and again, there are others,—at least such well-marked symptoms as to have acquired the names, if not the importance, of disease,—which it is difficult to place, from our not perfectly understanding where they have their seat, as otalgia and tinnitus aurium; but these are objections to which every synoptical arrangement must be liable.

DISEASES OF THE AURICLE, AND THE AURICULAR REGIONS.

Congenital Malformations and Diseases of the Auricle.	Imperfect or irregular development. Wanting. Double. Cleft. Nævus.
Wounds and Injuries.	Incised wounds. Lacerated do. Contused do. Fracture of cartilage.
Alterations from Pressure.	Flattening and obliteration of helix. Sloughing and gangrene.
Tumours.	Encysted. Steatomatous. Synovial. Keloid and fibrous. Hypertrophy and fatty deposit.
Inflammation.	Phlegmonous—diffused and circumscribed. Erysipelatous—acute and chronic. Exanthematous. Gouty. Frostbites, and chilblain.
Affections of the Skin.	Eczema. Herpes. Pemphigus. Syphilitic ulceration. Lupus.
Cancer.	
Affections of the Mastoid and Pre-Auricular Regions.	Inflammation of mastoid periosteum. ——— of mastoid gland. Chronic abscess on mastoid process. Aneurism. Caries of mastoid process. Abscess in front of tragus. Mumps, and glandular enlargements.

DISEASES OF THE EXTERNAL MEATUS.

Congenital Malformations.	Meatus wanting in bone and cartilage. ——— double. ——— contracted or tortuous. ——— closed by false membrane. ——— polypous excrescence in.
Wounds and Injuries.	(*See* Auricle.)
Foreign Bodies in.	
Diseases of Cerumenous Glands.	Increase of cerumen, chronic and acute. Deficiency of cerumen. Alterations in quality of cerumen.
Inflammation.	Acute; circumscribed;—abscess. Catarrhal and Chronic;—Otorrhœa. Acute diffused;—Otorrhœa. —— Rheumatic. —— Exanthematous;—Otorrhœa. —— Gonorrhœal;—Otorrhœa. —— Periosteal;—Otorrhœa and caries.

DISEASES OF THE EXTERNAL MEATUS—*continued.*

Affections of the Skin.	Eczema and herpes. Thickening and morbid growth of cuticle. Piligrowth. Ulceration.
Morbid Growths, and Alterations in Canal.	Collapse. Stricture. Dilatation. Polypus and granulations. Exostosis. Morula and condylomata.
Fistula.	
Caries.	
Malignant Disease.	Osteosarcoma. Cancer and fungus.

DISEASES OF THE MEMBRANA TYMPANI.

Congenital Malformations.	Wanting. Covered by false membrane.
Wounds and Injuries.	Rupture. Mechanical injury.
Inflammation.	Acute, circumscribed;—abscess. ——— diffused, Rheumatic. ——————— Gouty. ——————— Exanthematous;—Otorrhœa. ——————— Gonorrhœal;—Otorrhœa. ——————— of mucous layer;—Otitis. Subacute. ——————— Syphilitic. ——————— Strumous. ——————— Typhoid. Chronic; granular;—pannus.
Alterations in Cuticular Layer.	Eczema and herpes. Thickening from pressure.
Ulceration.	Perforation; Total destruction; } Otorrhœa.
Opacity and Morbid Deposits in.	Lymph effusions and thickening of middle layer. Atheromatous and calcareous deposits.
Alterations of Position.	Collapsed or flat, tympanum open. ——————— Eustachian tube closed. ——————— from adhesions in tympanum.

DISEASES OF THE CAVITAS TYMPANI.

Congenital Malformations.	Cavity wanting;—(osseous). ——— filled with morbid deposit. Ossicula wanting, irregular, or misplaced. Fenestræ wanting.
Wounds and Injuries.	From fracture, or penetrating instrument.
Hæmorrhage.	

DISEASES OF THE CAVITAS TYMPANI—*continued.*

Inflammation.	Acute Otitis;—Otorrhœa. ———— Rheumatic. ———— Gouty. ———— with paralysis of portio dura. ———— Exanthematous and typhoid. Subacute, Catarrhal. Chronic, with thickening of the membrane,—membrana tympani perfect. ———— the cavity exposed from perforation or destruction of membrana tympani. Periosteal;—Otitis, Otorrhœa, disease of brain. Of mastoid cells.
Caries.	
Morbid Growths.	Polypus and granulations. Strumous matter. Ossification of fenestræ. Osteosarcoma, and exostosis. Fungus hæmatodes.
Diseases of Ossicula.	Anchylosis. Displacement. Loss of.

DISEASES OF THE EUSTACHIAN TUBE.

Congenital Malformations.	Wanting. Imperfect.
Foreign Bodies in.	
Inflammation.	Catarrhal. Chronic, with thickening of membrane. Syphilitic;—ulcerative.
Obstruction or Occlusion.	From thickened and relaxed membrane. —— Mucus. —— Stricture and occlusion. —— Disease of throat and cleft palate.

DISEASES OF THE LABYRINTH.

Congenital Malformations.	Labyrinth wanting, irregular, or imperfectly developed in some of its parts. ———— filled with caseous matter. Auditory nerve wanting or atrophied.
Wounds and Injuries.	Fracture, with serous or bloody effusion. From penetrating instrument.
Inflammation.	Otitis;—Otorrhœa;—cerebral disease.
Caries.	
Malignant Growths.	Fungous hæmatodes. Osteosarcoma.
Tinnitus Aurium.	From cerebral disease. —— aural disease.
Otalgia.	With exaltation of hearing. Without exaltation of hearing.
Nervous Deafness.	From cerebral disease. —— disease of auditory nerve.

DEAF-DUMBNESS.

Congenital.	From malformation. Without apparent defect.
Acquired.	From local affections. —— disease of brain or nervous system.

CHAPTER IV.

DISEASES OF THE AURICLE, MASTOID REGION, AND EXTERNAL MEATUS.

Anatomy of the Auricular Region: the Auricle and External Auditory Canal.—Congenital Malformations and Diseases of the External Ear; Irregular or imperfect Development.—Wounds and Injuries of the Auricle.—Alterations in form.—Morbid Growths. Inflammations.—Gout.—Cutaneous Affections: Eczema, Herpes, and Pemphigus.—Cancer.—Affections of Mastoid and Auricular Regions.—Post-aural Tumours.—Disease of Mastoid Gland.—Inflammation of Periosteum.—Chronic Abscess.—Aneurism.—Caries.—Cerebral Otorrhœa.—Injuries of External Meatus: Foreign Bodies in.—Diseases of Cerumenous Glands.—Inflammations: Acute, Chronic, and Specific.—External Otorrhœa.—Fistula and Caries.—Cutaneous Diseases; Piligrowth.—Morbid Growths.—Polypus, Exostosis.—Alterations in form of Canal.—Malignant Diseases.

IT is not my intention to enter minutely or at any length upon the subject of the anatomy of the organ of hearing, but simply, to preface the description of the diseases of each particular part with a brief sketch of the structures which those diseases engage, in order to revive in the memory of the reader some general knowledge of the parts under consideration.

An ear consists of two portions, a sensitive and a mechanical; the latter being generally subservient to the former, and modified according to the peculiar habits, exigencies, and mode of life of the different classes of animals: in fishes, cetacea, and amphibians, to inhabit the water; in birds and insects, to progress through the air; in moles, to burrow and seek their food under the ground; and in man and other terrestrial animals, to walk on the earth.

The human ears are situated in the temporal bones, one on each side of the cranium. Each temporal bone consists of three parts,—the superior, thin, squamous, or scale-like portion, which overlaps the frontal and parietal bones upon the temporal region, but which is seldom engaged in aural diseases; the mastoid, or posterior inferior part, thick and rough for the attachment of muscles, and hollowed into cells, which communicate with the cavity of the tympanum, for the purpose of increasing the surface

on which sound acts; and the petrous portion, so named from its stony hardness, which passes inwards from the junction of the two former to form a part of the lower arch or base of the skull; besides various processes, the chief of which are the zygomatic and the styloid. In the petrous portion is placed the special organ of hearing. Anatomists have divided the ear into three parts: the internal, or labyrinth, containing the expansion of the auditory nerve, and including the cochlea, vestibule, and semicircular canals; the middle, or cavitas tympani, enclosing the chain of ossicles, bounded externally by the membrana tympani, and internally by the outer wall of the labyrinth, communicating posteriorly with the mastoid cells, and having an inferior exit through the Eustachian tube; and the external ear, consisting of the meatus auditorius externus, and the pinna or auricle.

Viewed externally, the parts which become concerned in diseases of the ear, and which may be styled the aural region, are contained within that space between the malar bone in front, and the edge of the occipital behind, bounded above by the attachment of the temporal muscle, and below by a line drawn from the angle of the jaw to the lower margin of the mastoid process. In the centre of this lateral space of the head is placed *the auricle*, a cartilaginous projection, varying in size, shape, and angle of attachment in different races of men, as well as in different individuals; and in the lower animals presenting all those modifications applicable to their respective circumstances and habits of life, with which every one is familiar. The human ear is an irregularly-curved plate, with its concavity directed forwards and outwards. It consists of the outer fold or hem turned over on itself, and called the helix, broad and deep in front, where it rises from the upper boundary of the external meatus, and gradually becoming narrow, thin, and fleshy, as it is lost in the lobe behind and below. Its size, shape, and amount of overlapping varies considerably in different individuals, and in many persons this fold is altogether wanting, particularly posteriorly; we also frequently find in it small hard nodules. Within the helix is another elevation, denominated the anti-helix, of a somewhat triangular shape, arising in front by two roots from behind the

anterior curvature of the helix. Curving upon itself, it forms the superior and posterior boundary of the concha, and ends in the anti-tragus, a nipple-like projection from which the lobe depends. Between the eminences of the helix and anti-helix runs a deep groove, called the navicular fossa; while the space between the roots of the anti-helix is—after the usual fashion of the old anatomists, when they had exhausted their various similitudes—called the fossa innominata. In front of the external auditory aperture, which it partially overlaps, and arising below the roots of the zygomatic process, is a concave triangular projection, called the tragus, on account of a tuft of hair resembling a goat's beard, which in some persons, particularly in advanced life, grows from its tip. From the base of the tragus being in immediate contiguity with the temporo-maxillary articulation, it is moved by the action of the jaw, particularly in eating. The cellular and adipose substance in front of its anterior edge is often the seat of inflammation, and hence arises the pain experienced in such cases from any motion of the lower jaw; and the temporal artery passing through this space, and there giving off the anterior auricular, may account for the unusual amount of throbbing felt in abscess of this region. The largest concavity is the concha, which, leading into the meatus in front, forms posteriorly the hollow of the external ear, and is bounded above by the roots of the helix and anti-helix, behind by the concave margin of the latter, and below by the anti-tragus and a gutter-like fossa, which passes downwards somewhat in front of the lobe. The concha is generally capacious enough to contain the top of the thumb. All these eminences and depressions, as well as the posterior, inferior, and a part of the anterior margin of the meatus, are fashioned out of one continuous cartilage, which may be denominated the skeleton of the ear. Pendant from the lower edge of this cartilage is the lobe, a fleshy projection, more or less long and thick in different individuals, and passing off anteriorly into the integuments of the cheek beneath the tragus. It contains a quantity of cellular and some adipose tissue, and is very extensile, as may be seen in inflammations, dropsy, and emphysema, &c. From time immemorial, and among all nations, this part has been adorned.

The cartilaginous portion of the ear is invested with a strong perichondrium, and the whole is covered with an envelope of fine integument, highly vascular and sensitive, so as to be even susceptible of blushing and other peculiar impressions consequent upon mental emotion. It contains many sebaceous follicles, particularly in the concha, where they sometimes become enlarged, and present those dark worm-like bodies with which every one is familiar. In some adults the auricle has a thick, leathery feel, and it is often, even in the normal state, of a bluish purple colour. Even in some new-born children we observe hair growing from the upper margin of the helix, and in several hirsute males in middle life this is a common place for tufts of hair to project from, as well as from the anterior surface of the lobe, the tragus, and the anti-tragus. The hairs growing from these parts and around and within the external meatus, though short, are generally very stiff, like the eyebrows of some aged persons, and often become a source of annoyance either by being entangled with the cerumen, or by falling inwards, and irritating the membrana tympani.

The auricle is attached by ligaments, muscles, and the common integuments, to the skull, and by dense ligamento-cellular membrane to the anterior, inferior, and posterior margin of the meatus, extending from the root of the zygoma to the mastoid process. Among civilized nations this part is not so well developed, does not stand out at the same angle from the head, and its muscular apparatus is not so much called into action as in savage people, whose means of safety or subsistence depend to a certain extent on their powers of hearing. Any one who observes the ears of a greyhound when that animal's attention is specially engaged may form some idea of the beautiful muscular apparatus which an ear in its natural condition possesses. Still, we often meet persons who have the power of moving the external ear in different directions, principally upwards, backwards, and a little forwards.

Two sets of muscles have been described as belonging to the human ear, but in the great majority of individuals they are either rudimentary or are altogether wanting. The first, or the extrinsic, are those which, attached to the head, move the exter-

nal ear as a whole; the second, or the intrinsic muscles, arising from particular portions of the cartilage, and inserted into other parts of the same structure, serve to increase its various concavities, and doubtless, when well developed, they assist to render the external ear at particular times a better collector and conductor of sound. Besides these muscles, certain fissures, described by Santorini, traverse the base of the cartilage near its attachment, particularly where it forms the anterior triangular wall of the flexible portions of the meatus,—which are supposed to contain muscular fibres, capable of shortening that passage. It is said that the tyrant Dionysius had a subterranean chamber constructed in the shape of the human ear, which was in connexion with an adjoining prison, and which he employed for the purpose of transmitting whatever was said by those confined therein.

The size and form of the external ear have been justly considered characteristic of beauty and breeding; and the national peculiarities of this feature are not unworthy of attention, as also its figure and position in some of the bygone races. Those familiar with ancient sculpture and painting, particularly among the Oriental monuments, must have observed many varieties of it. It has been stated that in the ancient inhabitants of Egypt the ear was placed unusually high; I have examined a great number and variety of the crania of that people, and I have not found the external meatus misplaced; but in the paintings and statues the auricle appears to be prolonged upwards. This peculiarity is more noticeable among the Asiatic races, strangers, slaves, and captives, than in the true natives of the land, as may be seen from Rosellini's faithful illustrations of the ancient Egyptian paintings. My late esteemed friend, the talented S. G. Morton, of Philadelphia, has given some notices of the external ear in his valuable ethnological writings.

The mastoid region may be defined as all that semilunar space, for the most part uncovered by hair, behind and partially overlapped by the auricle. Beneath the delicate skin of this part we often meet one, sometimes two, small glands lying parallel with the posterior attachment of the auricle; there is then a strong fascia covering the tendinous expansion of the sterno-

mastoid muscle, and finally the periosteum. The posterior-auricular branch of the occipital artery runs close to the junction of the auricle and scalp, and its position should be borne in mind in making incisions in this spot.

The meatus auditorius externus exhibits greater variety in length, shape, and direction than works on anatomy would lead us to believe. It is an irregularly curved tortuous tube, wider at the extremities than near the middle—from an inch and a quarter to an inch and a half in length—ovoid in caliber externally, but becoming circular towards its distal end: and leading from the concha externally, at first a little forwards and upwards, then backwards and inwards, and again turning downwards, forwards, and inwards, to the membrana tympani, which separates it from the middle ear. Owing to the oblique position of this membrane, the depth or curvature of the glenoid cavity, and also from the cartilage beneath being more complete, and prolonged inferiorly, the roof of the external meatus is somewhat shorter than its floor. It is only by constant inspection, and also examining a number of casts of this passage, that we can understand its bearings and different curves. Independent of the oblique position from above downwards of the membrana tympani, there is a very well-marked obliquity presented by the tympanal end of the bony meatus, which spreads forwards and downwards behind the glenoid cavity, where the bone is remarkably thin, and sometimes perforated with small apertures. It is difficult to bring this portion into view in the living state, but it is frequently the seat of polypus, which, when of a small size, often lies concealed therein, and keeps up discharge long after the rest of the canal has assumed a healthy character. It is best seen from within by making a section of the bone behind the groove for the attachment of the membrana tympani. The bony meatus is about three-quarters of an inch in length; its outer margin, particularly below, from the root of the zygoma to the mastoid process, is rough for the attachment of the auricle, which is fixed to it by strong fibro-ligamentous material. The external third or more of the meatus auditorius externus is formed partly of cartilage and partly of fibro-cellular tissue, and it is this portion alone which is capable

of dilatation even to a slight extent, but being susceptible of considerable motion, it can be so far straightened as to permit a direct stream of light to pass in through the immovable bony portion to the membrana tympani. The anterior outer wall of the external meatus, formed by a triangular portion of cartilage within and below the tragus, is influenced by the action of the condyle of the jaw, as may be perceived by placing the point of the finger within the meatus, and then opening and shutting the mouth. In cases of inflammation of the passage, the motion of the jaw, as also sneezing or coughing, causes on this account great pain and distress. The parotid gland also coming up thus far, and surrounding the lower and part of the anterior wall of the meatus, causes, when inflamed, pain in the ear and deafness. The periosteum and perichondrium—the former of which is remarkably delicate—are covered by a reflection of the cutis from the auricle, which is remarkably fine and vascular where it lines the osseous portion, and its cuticular layer is reflected over the external surface of the membrana tympani. This cuticular lining is susceptible of considerable thickening either by pressure or inflammation, often presenting a macerated appearance: and in the dead subject it can sometimes be drawn out entire, like the finger of a glove.

Within the external margin of the passage, and in some persons as far in as the junction of the osseous meatus, there are a number of fine hairs, styled vibrissæ, which, all pointing towards the centre of the canal, serve to exclude insects or extraneous bodies, but which, in cases of impaction of the canal with wax, act like so many nails to retain the offending plug *in situ*.

Imbedded in the integument of the meatus, chiefly in the membranous portion, and most abundant posteriorly, we find the cerumenous glands of Wharton; as a whole resembling a ring with the setting behind,—each gland being somewhat the shape of a Florence oil-flask. These secrete the substance so well known as cerumen or ear-wax, of a brownish yellow colour, adhesive, bitter, ignitable, composed of a peculiar animal matter resembling wax, lactate of potash, and some lime. There can, I think, be little doubt that the ear-wax exercises some useful influence

in perfecting the external auditory passage as an acoustic instrument, as well as serving to exclude insects. It is frequently deficient, or altogether wanting, in cases of long-continued deafness, so that it is generally believed to be one of the causes of defective hearing, and various nostrums are still in use for promoting its secretion. I believe that the true cause of its deficiency consists in inflammation of the glands from which it is secreted, or of the structures in which they are placed. I have examined numbers of the congenitally deaf and dumb, in whom the secretion was quite abundant; and I have even seen it accumulate in these persons, and produce such uneasiness as to require removal.

MALFORMATIONS OF THE EXTERNAL EAR.

The temporal bone as a whole is never, that I have heard of, wanting, but great variety exists with regard to its different parts, each of which presents congenital abnormities, which shall be considered in detail. The external contour, particularly of the squamous portion, is very variable, and seems to assume a special or fixed character in different races of mankind. There is in the College of Surgeons in Dublin the deformed skull of a boy aged 16, who, I understand, died in one of our prisons while under sentence of transportation, in which the left side is quite flat, and there is no trace of squamous suture. Upon examining the cranium one cannot help asking,—Would not that poor boy have been a more suitable inmate for a lunatic asylum than a convict prison?

The auricle is not fully developed until the sixth month, and is that portion of the auditory apparatus most liable to variety and irregularity. Its peculiarities are sometimes so very slight that those only who are in the habit of examining ears daily can perceive any difference from the normal condition of this portion. The size and shape of the whole auricle is very various in different families and individuals. The helix is, as already stated, often wanting; the lobe still more frequently. The concha, instead of being a concavity, is sometimes a convexity. The auricle is sometimes represented by a mere fold of skin; I saw such a case in consultation with Dr. Forrest some years ago; it occurred in an infant, and only existed on one side. Instances have been

recorded of the total absence of the auricle, yet it is said the persons heard well. Schmalz, in his *Beiträge zur Gehör und Sprach-Heilkunde*, 1846, has figured three cases of congenital deformity of the auricle, in the most remarkable of which there was no external meatus, and the upper portion of the helix alone was normal. This part has also been found cleft. A plurality of auricles has been remarked. Cassebohm relates the case of a child with four ears, two naturally placed, and two lower down on the neck; there were in that instance two petrous portions to each temporal bone. Four auricles are not uncommon among some of the lower animals, swine in particular : the old Irish pig, with long legs, high back, and narrow snout, had very frequently supernumerary auricles, small and misshapen, situated low down on the neck. Sheep have sometimes four ears. Professor A. Thompson has given a " notice of several cases of malformation of the external ear," in the Edinburgh Monthly Journal, but his description is rather unsatisfactory, inasmuch as in the first case, that of W. B., the peculiar malformation of the auricle is not specified; in the second case, that of a young lady at Falkirk, she, he states, presented " the same kind of malformation to a greater extent than in W. B.; and along with the local malformation of the ear, considerable imperfection in the lower part of the face;" and in the third case, that of Miss R., " the form of the imperfectly developed auricles, and the shape of the countenance, presented a remarkable similarity to those of the girl at Falkirk."—See Numbers for December, 1846, and April, 1847.

The same essay contains some remarks upon the causes of muteism, which I cannot refrain from adverting to here. " The instances," he says, " are extremely rare, however, in which deaf-dumbness is caused by congenital malformation of any kind, and it is sufficiently well known to all those who have been connected with institutions for the deaf and dumb, that in by far the greater number of instances of deafness, either total or to such a degree as to induce dumbness, the affection has proceeded from diseases in early life, such as scarlet fever, measles, and small-pox; the inflammatory and suppurative process affecting first the cavity of the tympanum, and being subsequently communicated to some

part of the labyrinth." Surely the Professor cannot have examined any of the works treating of muteism, or he would have been aware of the well-established fact, that in every country in which the subject has been carefully examined, and faithful statistics collected, the number of the acquired cases of deaf-dumbness is about one-eighth of the whole. A case has been related in which the auricle consisted in a fold of integument perforated with two apertures, and with the concavity turned towards the head. The auricle is sometimes the seat of congenital nævus, either alone or in connexion with the same disease in the neighbouring parts. In 1810 the late Professor Colles tied the posterior auris for aneurism by anastomosis of the auricle.

Congenital malformations and abnormal peculiarities of the external meatus and auditory canal are by no means uncommon; the passage is frequently smaller, and often more tortuous than natural, and it has been found closed with a polypous excrescence at birth. There is great variety in the length, caliber, and curvatures of the sides of the external auditory passage among different persons,—perhaps just as much as there is in the shape of the nose, the auricle, or any other feature of the face. I had no idea how much diversity existed in the auricle until I began to study diseases of the ear; and latterly I have so frequently observed congenital peculiarities and malformations of the auricle in persons who have applied for advice on account of some aural disease, that I have been forced to the conclusion, either that these peculiarities occur much more frequently than is supposed, or that, in some way which is at present unaccountable, persons possessing such peculiarities are more subject to aural diseases than the rest of the community.

I have met with cases, both in children and adults, in which the external auditory canal would not admit anything larger than the end of an ordinary dressing-probe. I have also seen an hour-glass contraction in the centre of the passage, which, although it had never impaired the hearing, was yet a considerable impediment to the removal of some hardened wax which had accumulated behind it. The external meatus is sometimes preternaturally wide. The meatus has been found double; the

supernumerary canal opening behind the auricle. False membranes stretching across the meatus have been recorded by many observers; and such cases are susceptible of relief by surgical operation, although considerable difficulty is always experienced in keeping open the newly-formed aperture. Several cases have been noted of imperforate meatus with and without any abnormal condition of the auricular cartilage. Sometimes the place of the external aperture is merely marked by a slight depression in the skin, at others the membranous portion of the canal is perfect, but beyond that all is solid bone. I have met with three such cases: one was a boy six years of age, labouring under otorrhœa on the left side; upon the right the membranous portion of the canal was perfect, but the osseous part was closed by firm bone, covered by a thin layer of integument. The second was in a woman, aged 30, born deaf and dumb; there was no osseous canal on either side. The third case was as follows:—

A female, aged 20, applied at the hospital on account of otorrhœa of the left side. On examination, I found the right auricle normal, but the meatus ended in a shallow *cul de sac*, lined by smooth, white membrane, which just admitted the end of the little finger. She was completely deaf on that side, but, strange to say, until she had the inflammation and otorrhœa of the other, she was quite unconscious of her imperfection. How frequently do we meet with instances of total blindness of one eye, evidently congenital, discovered by the merest accident long after birth. Although the bottom of the shallow cavity in this case felt and sounded solid, I determined upon exploring it, and made upon two occasions a crucial incision; but all behind the membrane, which appeared to be a thin layer of cartilage covered with fine integument, was perfectly solid.

WOUNDS AND INJURIES OF THE AURICLE.

These injuries, either from accident or design, are not as frequent in this country, nor indeed any other, as in former days. "Cropping the ears" was, in the time of the civil wars, not an unusual punishment, and it is still resorted to in some Eastern countries. I remember a baker in Cairo being nailed by the ear

to his own door for selling bread beneath the standard weight. The punishment was a very severe one, as the man's toes scarcely touched the ground. I suppose "nailing the ear to the pump" was, from the popular adage, a common form of punishment in other days. Splitting or cutting off the ears was a cruel mode of maiming and ill-treatment resorted to by the insurgents in this country formerly; yet we read in history of celebrated generals forwarding to their sovereigns the ears of the vanquished, as trophies of conquest. Having had an opportunity of examining many of the wounded French soldiers after the battle of Constantina, I was struck with the number of sword-gashes about the head and face, and of the auricle in particular. I was informed they were inflicted by the yataghan, the mode of using which, somewhat after the fashion of carving a round of beef, may explain the way in which these wounds were inflicted. In Germany, when sword duels were common among the students, surgeons had considerable practice in simple incised wounds of the ear. Instances have been related of adhesion having taken place even after the part had been completely removed. Writers seem to be averse to the employment of sutures, but we have not in these kingdoms much experience of the matter. The application of lint, spread with white of egg, so as to keep the parts in strict apposition, I have seen used with advantage. A cork pad, accurately adjusted to the space between the posterior surface of the auricle and the mastoid region, has been recommended, but the ingenuity of the surgeon will, I think, without adhering to any definite rules, generally enable him in every case to adapt the means to the end. I have seen the auricle lacerated and contused by pressure against a wall, by falls, and by the transit of a cart-wheel; and in the days of faction fights in Ireland, I have dressed many dozen auricles split and bruised by blackthorn sticks, and have often wondered at the small amount of injury or deformity which follows such injuries. Fracture of the cartilage has taken place from suddenly and violently doubling up the ear.

The operation of piercing the lobe for the introduction of ear-rings, either as a sanitary measure, or for ornament, so common among all nations, is not always unattended with unpleasant con-

sequences. I have seen it give rise to erysipelatous inflammation, to eczematous eruptions spreading over the side of the face, and also to abnormal growths in the lobe. Piercing is usually performed with a sharp awl pressed through, against a cork held at the back of the lobe, by the jewellers, and those who dispose of the wares, ornamental or medicinal, to be inserted therein.

The skin of the auricle is, as already stated, highly sensitive. People speak of "blushing to the ears," because that part becomes red and hot upon mental emotion. Besides this, there are many popular adages relating to this part. We have all felt one or both ears unaccountably hot, and apparently swollen at particular times. If the left ear is red, it is said "somebody is speaking well of you," but if the right, the contrary. When, according to the Mosaic law, a bondsman's term of servitude had expired, and that from affection to his master he desired to remain, the owner was directed to "take an awl and thrust it through his ear unto the door: and he shall be thy servant for ever"—Deut. xv. ver. 17;—and my friend, Dr. Carter, has informed me, that whenever a negro in the West Indies wishes to attach to himself a dog, he nails his ear for a day to the door-post of his cabin. The state of the auricle is said to be characteristic of disease in other organs: it is red in congestion of the head; livid in diseases of the circulating system; and cold, thin, and insensible in nervous deafness, or in diseases of the internal ear. Pulling children's ears is, I have no doubt, conducive to inflammatory affections, both in the auricle and meatus. Boys increase the angle of the auricle, and give themselves what are called "dog's ears," by pulling down their hats or caps; and, on the other hand, old women, from having tied up the auricle for many years, have so squeezed and flattened this part, that it lies close to the head, and the various curvatures, particularly of the helix, are obliterated. Sloughing and gangrene may ensue from long-continued pressure during lingering illness, or from exposure and want of due circulation, as in fever, when the extremities at times mortify.

Baron Larrey's work, alluded to at page 48, contains some valuable observations upon wounds of the auricle, and the mode of treating them. Among other matters he mentions a case worthy

of consideration in a medico-legal point of view. An officer of the French army stated that he was attacked by a stranger, who cut off his ear, but Larrey, on examining the wound, discovered that it had been done by the teeth. He also mentions the case of a soldier, whose meatus had been grazed by a musket-ball, and the parts adhering subsequently, the external aperture was thus hermetically closed by the cicatrix. As the man's hearing remained perfect, this case attracted great attention, and he was introduced at one of the meetings of the Philomathic Society, in the winter of 1815–16, as a singular instance of the preservation of hearing after he had " lost, according to his own statement, several small pieces of the meatus itself, besides *all* the small bones of the ear!" No doubt a French soldier is a very intelligent person, but whether his word should have been taken by the *Savans* with respect to the loss of the ossicula auditus is questionable; and whether the Baron should have published the case as a " surprising circumstance," without having made some attempt to explore the state of the membrana tympani by dividing the external cicatrix, is still more so. I mention the case, however, in order to show the looseness which prevailed among medical writers, even of the first eminence, with respect to diseases of the ear, twenty years ago.

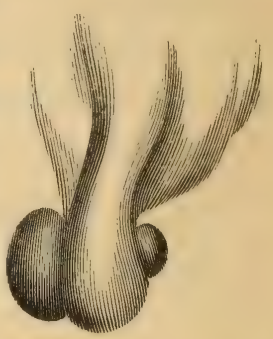
TUMOURS OF THE AURICLE.

Morbid growths of the auricle are by no means uncommon: steatomatous and sebaceous bodies form in the concha; I have three times removed firm, encysted tumours, each the size of a hazel nut, from the posterior end of the helix. Hypertrophy of the lobe has proceeded to such an extent as to reach to the neck. Boyer, in his Treatise on Surgical Diseases, has related the case of a large pendulous lobe of that description, which he removed. The following case of fibrous tumour of the lobe, No. 19 in the Registry, is a good example of its kind.

M. S., a female, aged 19, has a hard, firm, ovoid tumour, occupying the centre of the lobe on each side, but largest on the left—of which the accompanying woodcuts afford faithful representations. It is of a stony hardness, and is quite distinct both from the cartilage above and the fleshy part of the lobe, which it appears to pass through. The skin covering it is smooth, and of

a light pinkish hue, like that of a keloid tumour. It grew gradually from the orifice made for holding the ear-ring, and has been several months attaining its present size. The tumour upon the opposite side, which also surrounds the hole made for the ear-ring, is much paler in colour, and not larger than a garden pea. The girl states, that she experienced a great deal of pain and soreness in the wounds made in piercing her ears, and that about three or four months afterwards she was obliged to remove the ear-rings on account of the irritation they produced. The large tumour was dissected out, and the elliptical aperture left in the lobe brought together with sutures. It healed kindly, and the disease did not return. This second cut shows the shape of the tumour in profile. A section of the tumour exhibited a dense yellowish-white fibrous appearance, and was so hard that the nail made little impression upon it. I saw this patient about six months afterwards, and as the excrescence in the lobe on the right side had not increased, she was unwilling to have it interfered with. Mr. Williams, in his Treatise on the Ear, relates a case of tumour of the lobe which was removed by Professor Syme, and which, from the description, would appear to be very similar to that which I have described.

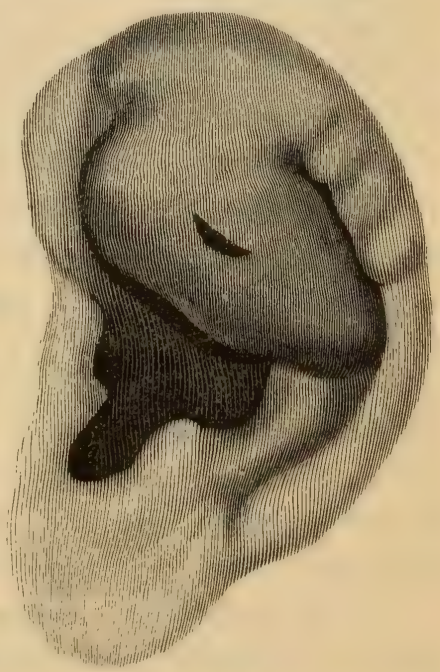




If tumours of this description were frequently to follow the irritation caused by piercing the ears, we should find them much more common, particularly among those nations who wear very large, heavy, pendulous ornaments there; but I have frequently seen the hole made to hold the ear-ring elongated to a slit three-quarters of an inch long in some of the African and Oriental tribes. The South Sea Islanders introduce pieces of wood, shells, and other large substances, into apertures made in the lobes.

In a case of goitre, where the tumour extended over the side of the neck, along the course of the mastoid muscle, which I remember seeing in the west of Ireland some years ago, the lower portion of the auricle was enlarged to the size of the palm of the hand; and we read that pendulous tumours, growing from the external ear, are not unfrequent in those parts of India where goitre prevails. Dr. Graves has published a case of fatty deposit in the lobes;—the patient died subsequently, and Dr. O'Ferrall found, upon dissection, a fatty degeneration of the liver, and fatty deposits in other portions of the body.

J. E., a male, aged 24 (No. 18 in Registry). A tumour, about the size of a small pear, occupies the upper portion of the left auricle, between the helix and the concha. It is immovable, has a tense, elastic feel, like that of a hydrocele, and the skin covering it is smooth, and of a dusky red colour. The whole auricle is very hot, but the pain is not great. It is of three months' duration, and has been several times lanced by a medical man, and a quantity of glairy matter discharged; but as soon as the wound healed the fluid re-accumulated. Hearing unimpaired. The case when admitted presented the characters shown in the accompanying illustration.



A free incision was made through the entire length of the tumour, and about two ounces of glairy tenacious fluid, of a yellow colour, like that contained in a ranula or an enlarged bursa, but mixed with portions of flocculent matter, was discharged. The sac was found to be smooth and polished. The wound was dressed from the bottom, with dossils of lint, and a cold lotion was applied to the auricle. Under this plan of treatment the fluid did not again accumulate, but the auricle presented a hard, thickened, nodulated feel and appearance, which remained for months, and completely effaced the natural curvatures and si-

nuosities of that portion of the external ear. While the patient remained in attendance at the Institution, he took Plummer's pill and bark, and had the thickened auricle painted over with tincture of iodine every third day.

This is a rare form of disease in man, but I have frequently seen it in dogs, when it forms a hard lump attached to the end of the long flexible auricle. In one instance that I remember, it caused so much inconvenience to a valuable pointer, that it had to be excised. Mr. Ogier Ward has related cases of similar tumours in men and animals.

INFLAMMATIONS OF THE AURICLE

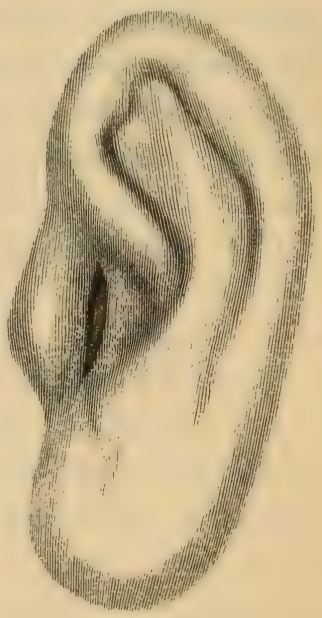
May occur idiopathically or from accident. *Simple phlegmon* is not common unless induced by the stings of wasps or bees, when the part swells to a great extent, but it seldom requires treatment. In idiopathic inflammation the most efficacious treatment is puncturing with a lancet, and the application of heat and moisture. The lobe occasionally suppurates, and small boils frequently form upon different parts of it, but their seat is chiefly round or within the meatus, in the consideration of which part they will be described. A German physician, Dr. F. Bird, has described a form of inflammation peculiar to insane persons, in which the auricle swells until, in some cases, the skin breaks, and the parts discharge thick dark-coloured blood and serum. Having no experience of this affection myself, I wrote to a number of medical friends connected with lunatic asylums, and although their statements varied both as to its existence and cause, the establishment of the disease, as affecting a particular class of the community in this country, has been fully established. Dr. Thurnham, of the Wilts Asylum, who has had so much experience on the subject of lunacy, is of opinion, that the disease has frequently been induced by injury, and that, consequently, it was much more common when restraint was extensively used than at present.

Acute erysipelatous inflammation frequently attacks the auricle. It, as well as phlegmonous inflammation, may occur in connexion with general otitis, and particularly inflammation of the external auditory canal; or it may be caused by the application

of leeches, or by mechanical injury. Generally, however, it spreads from the head and face, in which case a depôt of matter frequently forms in the auricle as well as in the eyelid.

Chronic erysipelas is a frequent form of disease, particularly among females in advanced life, in this country. Generally speaking, the patient has first an attack of acute erysipelas of the head and face. The ear, from being in such persons usually tied up and excluded from the air, does not resume its natural healthy appearance along with the other parts affected, and the patient has several repetitions of the disease in the ear alone, each attack leaving the auricle more thickened and misshapen, until it becomes a hard, lumpy mass, finally rendering the meatus a mere slit. It is a most tedious and irritating disease. The following case (No. 23 in the Registry) is, with the accompanying illustration, a good example of the affection.

T. M., a female, aged 52, has had frequent attacks of erysipelas of her head and face during the last five or six years. The effects of the disease are, however, now manifest only in the external ears, but more particularly the left. The auricle is not much enlarged, but has become hard, inflexible, and resembles a piece of wet, thick sole leather; its fossæ being apparently filled up by subcutaneous deposit. It is also somewhat shortened in its antero-posterior diameter. The skin is of a dusky brown colour, without any exudations, eruptions, or crusts upon it, but to the feel it is lumpy and nodulated, like what we find in certain forms of elephantiasis; the lobe in particular presents this thickened appearance. The disease has extended some way in front of the tragus, which is also thickened and lumpy; and the meatus is nearly closed.



Dr. Kramer relates cases of "scirrhous degeneration" of the auricle, but it would appear that he applied the term to affections similar to that now under consideration.

The treatment of acute erysipelas of the auricle differs in no way from the ordinary rules for the management of that disease elsewhere, and that of the chronic form just described is so similar to the treatment of eczema aurium, given at page 170, that I refer the reader thereto.

The various exanthematous eruptions affect the external ear as well as every other portion of the body. It is, however, remarkable, that although the ear is equally exposed with, and from its situation more liable to, irritation from pressure than the face, that it is seldom, even in the worst cases, marked with small-pox.

Gouty inflammation of the external ear has been fully established. Dr. Graves, who was the first to describe this affection, says, that the state of congestion of the auricle seldom lasts long, and generally subsides on the occurrence of the disease in the extremities.

I do not think that *chilblains* are now as common in this country as they were formerly, and perhaps this may be owing to the manifest change which has taken place in our winter climate during the last twenty years. In children and young persons who suffer from these affections, the auricles are, from their exposed position, particularly liable to be affected. In cold climates the external ear is constantly frost-bitten. During the severe winter of 1840–41 the hospitals of Vienna presented numerous examples of frost-bitten ears. At the same time scarcely a night elapsed without a soldier being frozen to death at his post.

Enlarged sebaceous follicles frequently present in the concha in pale, cachetic persons labouring under aural diseases. They are easily recognised by their dark heads, and can be pressed out with a pair of forceps.

CUTANEOUS AFFECTIONS OF THE AURICLE AND MEATUS.

Diseases of the skin of the auricle are by no means uncommon, and independent of the irritation which they produce, they may, if allowed to extend into the meatus, produce disease in the external layer of the membrana tympani, and deafness. The most frequent forms of skin disease in the auricle are eczema and herpes,

but diseases of the scalp do not usually affect that organ. Syphilitic ulceration is by no means uncommon, and rupiæ are frequently seated on the external ear.

The following case (No. 22 in the Registry) of *eczema aurium*, with thickening, and closure of the external meatus as a consequence thereof, is highly characteristic:—

M. Q., a female, aged 60, has been deaf, "off and on," for several years past, accompanied by noise and wandering pains in her head, with extreme itchiness in the auditory passages. The skin covering the auricle, and the scalp adjacent thereto, is of a fiery red colour, speckled with patches of yellow, formed by the exudation which has collected in thin branny scales all over it. The parts are hot, and in some places sticky, from a thin ichorous matter which exudes from the surface. The auricle has lost its natural shape, its folds and sinuosities being partially obliterated, and it has become hard, thickened, and lumpy. The external auditory aperture has, owing to the disease extending into it, been lessened to a third of its natural size, and it is filled with branny scurf. Upon removing the latter impediment, we can obtain but a very partial view of the membrana tympani, which appears to be thickened and opaque. Hearing distance, touching. The state of the parts is nearly the same on both sides.

In examining diseases of the external meatus and auditory tube like this, I find the small silver instrument, shaped like a blunt gorget, figured at page 55, very useful.

Cases of this description, and, like this, of long standing, are very hard to manage, because there generally co-exists some constitutional taint, as shown in the cutaneous eruptions often manifest in other portions of the skin, and because the parts now under consideration have become so much altered in form and texture, that it requires a long course of treatment to restore them to their natural condition, and thereby re-establish their usual functions. The disease principally occurs in females of middle and advanced life; but it also happens to children from six to twelve years of age. In the latter, however, it is of a much more active nature, at the same time that it is much more amenable to treatment. In young persons the eruption often co-exists with scald head, and

in both young and old, if the disease is allowed to exist for any length of time, it extends into the meatus, and even over the surface of the tympanal membrane, which it thickens and renders opaque. In old persons a collection of branny scales accumulates in the external tube; and in young persons a thick creamy discharge coats over the lining of the canal and the external layer of the membrana tympani.

Cleanliness and attention are indispensable to the eradication of these affections. In the first instance, continual poulticing with any emollient substance which keeps up heat and moisture is necessary. Linseed meal, boiled bread and milk, or well-mashed turnips, will be found useful applications. Afterwards, when the extreme heat, swelling, vesication, and redness, have subsided, a solution of the liquor plumbi, in the proportion of a drachm to the ounce, applied with several bits of fine lint, so as completely to envelope the auricle, and the evaporation prevented by covering over the whole with a piece of oiled silk, rarely fails to lessen the irritation, and reduce the parts to a healthy condition. The solution of gutta percha in chloroform, lately introduced by Dr. Graves in the treatment of other skin diseases, I have found a very admirable remedy in the chronic form of eczema aurium. The part should be painted over several times, until a complete varnish has been laid on, when the greatest relief from the heat and itching is experienced. The application should be repeated from day to day, as the material soon begins to peel off, but should never be applied until the acute attack has subsided. When the auricle is shining, of a bright red, and swollen, punctures made with the point of a lancet, particularly in the helix, will give great relief. In the chronic stage good may be effected by painting the part with a strong solution of nitrate of silver.

But while we employ these local measures, we must not neglect constitutional means. Strict attention to diet should be enforced; salt meats, savoury dishes, and pastry, ought to be avoided, and a sufficient quantity of fresh vegetables should be consumed at dinner. After the patient has been well purged, a course of Plummer's pill may be prescribed with advantage—at least, five grains daily for an adult; and, in a little time, some of the preparations

of sarsaparilla administered in lime water will hasten the cure, and assist to eradicate the disease from the system. This affection is very apt to relapse, and we should, therefore, continue both our local and constitutional remedies long after the inflammatory symptoms have subsided. Old ladies think they never can have a sufficient amount of warmth about the head, and it is very difficult to induce them to leave off even one flannel nightcap; but we should at least make the attempt, as the head and ear ought to be kept as cool as possible. As the swelling and inflammatory symptoms subside, we should again turn our attention to the state of the auditory tube. If any discharge exists, the meatus should be syringed gently with tepid water daily; and both it, the concha, and the tympanal membrane, washed over every second or third day with a solution of nitrate of silver of the strength of at least twelve grains to the ounce. Still more advanced in the progress of the treatment, when the exudation has completely ceased, and the thickened cuticle has been quite removed, much benefit will be derived from smearing over the tube and membrana tympani with brown citrine ointment (*Ungt. Citrinum Fuscum*) every third or fourth day. It should be applied in a melted state with a camel's-hair pencil, and diluted by about one-third of almond oil. This ointment, in which I have great faith in all diseases similar to that now under consideration, should be made with either rape-oil or cod-liver oil, instead of the olive oil with the lard or butter usually directed in the Pharmacopœias; it is then of a much darker colour, and never becomes hard or crumbly.*

* There is no other medicine in the whole Materia Medica so frequently prescribed by the practitioner which presents the same differences, both in appearance and effects, as the ointment of the nitrate of mercury. Prepared as directed in any of the Pharmacopœias of the three kingdoms, it is impossible to procure it alike in any four different establishments. It is found of all shades of colour,—straw-coloured, grey, green, yellow, orange, and of every degree of consistence, dry and hard, or soft and pasty. If mixed with almond oil, as in diluting it into an eye-salve, it soon becomes green, and gets a very unpleasant smell, whether covered up or not, and in this state it is often very irritating. Many apothecaries in Dublin do not adhere to the pharmacopœial formula, but make it up according to a form of their own; some use fresh butter instead of lard; and others, different kinds of oil, as from habit or experience they find best. On explaining my difficulties, some years ago, to Mr. Donovan, he procured me a citrine ointment of a very dark orange or brown

Besides those eczematous eruptions, many other cutaneous diseases affect the auricle, particularly in children. Excoriations take place in infants behind the ears during dentition. There is a popular belief that they are salutary. Cleanliness is their chief cure when it is advisable to heal them up.

We have a disease in Ireland—so prevalent in some counties that it would appear to be one of our national maladies—*Pemphigus Gangrenosis*, first described by the late Dr. Whitley Stokes, and of which I have given a description in the medical memoir attached to the Census of 1841. So fatal is this disease among children, that no less than 17,799 deaths have been attributed to it in ten years; and as it is a disease very well known to the lower orders, I am inclined to think that the amount has not been exaggerated. It goes under different local names, but the most common are "mortifying hive," "burnt hole," and "black ear;" the latter from its so frequently appearing behind the ears and upon the auricles. In the Irish it is styled *Ithcheadh*, or the eating disorder, from its phagedenic character. The vesicles, or bullæ, peculiar to this affection, generally leave an indelible and irregular lace-like depression, similar to that of vaccination.

Lupoid and other unhealthy ulcerations may either commence in the auricle or spread to it from the neighbouring parts. I am acquainted with, and possess a drawing of, a case of cutaneous can-

colour, soft, perfectly and equally smooth, and which does not alter in any way by keeping, by exposure to light, by mixing with oils, or even by being gently heated to the point of fluidity; and it never acquires an acid smell. Its therapeutic effects I have had long experience of, and they are decidedly superior to those of the ointment in common use. Mr. Donovan has not made known its constituents, nor its mode of preparation. Mr. Nicholls has made for me a citrine ointment precisely similar in colour, smell, consistence, and effects, and he informs me that he uses rape oil instead of olive oil, and does not let the heat employed during the preparation exceed 200°. Mr. John Evans has employed cod-liver oil, and also seal oil, and the preparations thus produced are exceedingly elegant and useful ones. Mr. Carroll likewise uses cod-liver oil in the composition of this unguent. Messrs. Bewley have obtained for me a brown citrine ointment, somewhat like those already mentioned, and they inform me that it is by using only the very purest olive oil. I find this ointment a decided improvement on the old preparation, and its composition should be investigated by those engaged in the preparation of medicines and pharmacopœias. When about to be used, it should be melted to the consistence of cream by placing the vessel containing it in hot water. It forms an admirable application in ophthalmia tarsi, as well as in various diseases of the ear.

cerous ulceration, extending from beneath the zygoma, which has eaten away the tragus, and completely occluded the external meatus. It remained nearly stationary for many years; sometimes it spread over the cheek, and at other times engaged a considerable portion of the auricle. Its progress has usually been arrested by the application of chloride of zinc. In character and appearance, as well as the peculiarity of the cicatrix which it leaves, it greatly resembles that form of cutaneous cancer affecting the eyelid described by Dr. Jacob. Excessively irritable sores, with hard elevated edges, frequently form on the external margin of the helix, but true cancer of the auricle is very rare. Mr. Travers, of London, has recorded a well-marked example, in which he removed the disease. The auricle remained unaffected to the last in those cases of malignant fungus of the ear which I have seen.

DISEASES OF THE MASTOID AND PRE-AURICULAR REGIONS.

As I have already remarked at page 56, the state of the mastoid region demands our most serious consideration.

Tumours behind the ear, and in any way connected with the mastoid process, require the immediate and special attention of the practitioner. Without entering too minutely into the subject here, I may specify six kinds of post-aural tumours with which I am familiar, and the situation and characters of which every surgeon should be acquainted with, as some of them may prove fatal in either the acute or chronic form.

There is a small gland lying upon the mastoid process immediately above the insertion of the sterno-mastoid muscle, and on a level with the tube of the ear, which sometimes enlarges to the size of an almond: it becomes highly irritable and painful to the touch, so as occasionally to resemble a neuroma. It generally occurs in young females. I remember one such case which I attended some years ago, and it was so painful that the lady could not bear to have it touched. The external application of iodine, and the internal exhibition of tonics, particularly iron, will in time remove these tumours, but the cure is always very tedious.

The second form of tumour is also glandular, and of this I have given an example on the next page. It is simply a suppurating

gland, and is not unfrequently met with in young children during dentition. It generally appears in scrofulous constitutions, and very often in persons who have suffered from some inflammatory action in the middle ear or the external meatus. Such was the case in the instance related below, as I learned from an inspection of the tympanal membrane, as well as from the loss of hearing. I never saw one of those suppurating glands, the great bulk of which was not below the level of the external meatus, and this is a diagnostic of some importance, as a very formidable and often fatal swelling, which sometimes occurs behind the auricle, is always seated higher up. The treatment for this form of tumour is generally such as was practised in the case described.

A. H., aged 19 (No. 3 in Registry), a grocer's shopman, residing in one of the back streets in an unhealthy part of the city, applied at the Hospital on account of a tumour which existed behind the right ear, and somewhat below the mastoid process. It was about the size of half an orange, oval in shape, hard to the touch, and of a purplish red hue, altogether very much resembling the character of a syphilitic bubo. It did not give the patient much uneasiness, and very little increase of pain was experienced on pressing it; he had not had any pain in the ear or the side of the head, and he says he never had otorrhœa. The tympanal membrane is partially thickened and opaque; he heard the watch only when touching. The left ear was normal in function and appearance. Although he stated that he was in his usual health, slept well, and had his ordinary appetite, he was evidently an unhealthy subject; his face was pallid; his skin had a greasy aspect; the pulse was small; and the tongue large, white, and its margin much indented by the teeth. He gave a very unsatisfactory account of his disease; said he never had syphilis, and bore no external mark of scrofula. What was the original cause it was difficult to say, and the patient appeared to be totally indifferent about his deafness. We sometimes find a patient remarkably apt and intelligent in all the affairs of life who can give but a very meagre account of the history or symptoms of any disease under which he may labour, whereas other persons seem to be endowed with a special and often morbid taste for medical details, so much so

that they sometimes neglect their ordinary worldly concerns that they may be able to talk over their complaints with any one who will listen to them. The patient was directed to foment and poultice the tumour; to avoid exposure to cold, and to take some aperient medicine.

This man did not return to the hospital until eight days had elapsed, as he said the lump gave him little or no inconvenience, and had opened two days ago. It then more than ever presented the characters belonging to a suppurating gland in the inguinal region. There was a large irregular opening, sufficient to admit the top of the forefinger; its edge was flabby, inverted, and of a deep purple hue. The interior of the cavity was smooth, polished, and of a dark red colour, totally devoid of granulations, and discharging a thin ichorous matter. He had no headach, did not sweat at night, but thought his strength and appetite were not so good as usual. Simple dressing was applied to the sore, a tablespoonful of bark mixture was ordered to be taken three times a day, and the patient was recommended to remove some distance into the country. Under this treatment the man recovered perfectly in a fortnight.

The third form of tumour I have only seen upon two occasions; it is a chronic abscess, very similar to lumbar abscess, and is, like it, I believe, generally connected with diseased bone. I remember a little boy at the hospital, about five years ago, who laboured under this disease upon both sides, and of which I possess a drawing. Each tumour was about the size of half a hen-egg, fluctuating, painless, and occupying all the bare space behind the auricle; the skin nearly of the natural colour, but traversed by several blue veins. I opened these tumours, from each of which poured a quantity of the usual scrofulous curdy matter. Almost the entire of the surface of each mastoid process was denuded and rough. The abscesses filled several times; the child's health gave way; hectic ensued, and, missing it for some time from the Institution, I made inquiry and was told by the mother that it had "died of convulsions caused by water on the brain."

The fourth form of tumour is the result of acute inflammation, either arising from periostitis of the mastoid process, and often

extending over the entire parietal region; or caused by accumulations of matter in connexion with the mastoid cells, the result of disease spreading from the middle ear; or it may arise from chronic inflammation and otorrhœa producing caries. With this external manifestation we sometimes meet with diseased action of a sudden and fatal nature going forward in the inner table of the skull, or within the cranium, in the membranes of the brain, and even the brain itself. This form of tumour should always demand our special attention, and the sooner we make a free incision in such cases, not merely of the integuments, but through the periosteum down to the bone, the better. Caries of the mastoid process is by no means uncommon, but its consideration properly belongs to the description of otorrhœa.

The fifth form of tumour is a true aneurism of the posterior aural artery, of which there is at present a case in Steevens' Hospital, under the care of Mr. Colles, who has kindly permitted me to make use of it.

A. F., a female, aged 27, states that four or five years ago she perceived a buzzing noise in her right ear, attended with an occasional throbbing sensation, particularly on laying her head down; that subsequently she applied for advice, and was syringed severely, but did not receive benefit. About eighteen months ago, she perceived a small, slightly pulsating tumour behind the auricle, and having been informed of the dangerous nature of it, she lately came up from the country to have an operation performed. The auricle is normal. On the mastoid region, occupying the angle formed between the bone and the back of the auricle, there is a pulsating tumour the size of an almond shell. It does not convey to the fingers the usual aneurismal thrill, but upon the stethoscope being applied to it, a well-marked *bruit de soufflet* is heard. Its external covering is very thin, but natural in colour. On compressing the artery with the point of the finger, near its source behind the lobe, the tumour is immediately lessened in size, and becomes flaccid, but resumes its bulk on removing the pressure. When the sac is emptied, the bone beneath feels rough. The membrana tympani is normal.

An endeavour has been made to apply pressure by means of

a pad, but owing to the curve of the mastoid process, where the posterior auris artery is given off from the occipital, and the way in which it lies into the angle formed between the auricle and the bone, the pressure has not been effectual. Mr. Colles purposes tying the artery.

The sixth tumour which occurs in this region is a malignant fungus, of which I have seen three cases: one in a boy aged 10, the others in adults who had passed 50.

Abscesses often form in front of the tragus, and glandular swellings of the side of the neck sometimes encroach upon the meatus, and impair hearing. When the fascia covering the parotid, or that gland itself, inflames, there is generally severe pain, throbbing, and tinnitus in the ear, increased by the motions of the temporo-maxillary articulation. The anatomical relations of the parts, and the close approximation of the parotid gland to the lower and anterior portion of the external meatus, accounts for the amount of aural pain felt in these affections, and also in that denominated mumps.

WOUNDS OF THE EXTERNAL MEATUS AND AUDITORY CANAL.

These injuries are rare; they are generally produced either by sharp penetrating instruments puncturing or lacerating the walls of the passage, by extraneous bodies forcibly impacted therein, or by the injudicious efforts of surgeons to remove them. I have frequently seen the lining of the meatus lacerated, bleeding freely, and subsequently sloughing from rude efforts made to explore the canal. After the abstraction of the irritating substance, the treatment of such injuries simply consists in subduing inflammation, and allowing the punctured or abraded parts to recover with the least possible degree of irritation. As in punctured wounds of the orbit, so in injuries penetrating the external meatus, or the cavity of the tympanum, a guarded prognosis should be given; as we know not when or where cerebral symptoms will arise which may endanger life.

Hæmorrhage from the external meatus may occur from a variety of causes, which, in a medico-legal point of view, it is of considerable importance carefully to investigate and fully to understand.

For instance, a dead body is found; there is hæmorrhage from one or both ears; and medical evidence is required with respect to the cause of death. Now, hæmorrhage from the external ear may arise from strangulation drowning, (?), concussion, fracture through the base of the skull, asphyxia produced by different causes, apoplexy, and other congested states of the circulation, as well as falls and blows upon the side of the head; but, although this symptom is thus enumerated among the post-mortem appearances, the precise cause of the hæmorrhage, and the locality and amount of lesion, have never been fully detailed. Bleeding from the external ear may occur in the progress of disease, from slight accident, or from the presence of polypus, or fungoid granulations in the meatus, and the amount of hæmorrhage is not in proportion to the extent of injury inflicted. In the same way, that peculiar "welling up" of serum—a well known characteristic of fracture of the base of the skull, passing through the petrous portion of the temporal bone—has yet to be fully explained. As the ear is a part through which fatal injuries might be inflicted without attracting the attention of a superficial observer after death, I do not think the subject of the post-mortem appearance of the ear has been sufficiently investigated by medico-legal jurists.

FOREIGN BODIES IN THE AUDITORY CANAL.

Foreign bodies sometimes get into the meatus by accident, and are oftentimes, particularly among children, introduced by design. The amount of pain and irritation which they cause is exceedingly various. I remember being out shooting in a plantation many years ago with a friend, who, suddenly exclaiming, "Oh! an earwig," and throwing aside his gun, fell on the ground, making the most piteous moans, and rolling about in convulsive agony. Finding that some small insect had got into his ear, I procured some water from a neighbouring ditch and poured it into the meatus; and, as I watched for the result, a little animal, well known among anglers as the hawthorn fly, crept out, and the gentleman was immediately relieved. The fright experienced by the buzzing of an insect in the meatus, as well as the pain and irritation which it causes, can only be appreciated by those who have experienced

that unpleasantness. The little animal denominated the earwig (*Forficula auricularis*) is said to have a peculiar liking for entering the external meatus, and the Dhor, or Dhor-deél (*Gœrius olens*), is believed by the lower order of Irish to be fatal if it enters any of the apertures of the body; and many of the diseases resulting from cold, or affections of the nervous system which follow sleeping in the open air, are attributed to this cause. The larvæ of flies have been found in the external meatus; and these maggots, having been removed, have in time turned into perfect animals. To dislodge insects where they cannot be seen and seized with an instrument, it is recommended to fill the meatus with oil, in order that their spiracula, by becoming obliterated, and their respiration thus impeded, they may be induced to creep out. This is a very good popular recommendation, but a little warm water and a syringe will probably prove a more effectual means of dislodgement. One of the latest English writers upon aural surgery, having recommended "sweet almond oil" as the best remedy for dislodging insects, reminds me of a quaint, and I rather think sarcastic, passage which I remember reading in one of Boyle's papers, who, in detailing the different cures said to have been wrought by marrow extracted from the thigh bone of a man that was hanged, asks whether the marrow from the thigh bone of any other man might not answer as well. Many instances have been recorded of death following the forcible introduction of foreign bodies, particularly splinters of wood, into the meatus, either by passing through the tympanal cavity into the labyrinth, or by exciting such inflammation in the injured structures as, by extending to the brain, induces disease in that organ. Peas and other seeds have been known to germinate by being allowed to remain in the meatus. No. 167 in the Registry is the case of a boy eight years of age, into whose external meatus one of his schoolfellows thrust a grain of Indian corn. The schoolmaster, in his wisdom, endeavoured to remove it by attaching a piece of wax to the end of a stick, and thrusting it into the meatus. After an hour's ineffectual effort, and the boy becoming almost convulsed with pain, he was brought to a surgeon, who endeavoured to remove the offending body by means of a forceps and other instruments. The hæmorrhage, how-

ever, which ensued was so great that it was deemed advisable to desist. I saw the boy four days after: a profuse fœtid discharge poured out of the meatus, on removing which the walls of the canal were found to be lacerated and in a sloughing condition; while at the bottom of the passage the grain of Indian corn, of a yellow colour, and with several breaks and scratches upon its smooth hard skin, caused by the instruments used to detach it, was visible. The slightest touch of it caused the most excruciating pain. With a curette similar to that with which I open the capsule in extraction of the lens,—its point being bent nearly at a right angle to the shaft, introduced cautiously between the grain of corn and the side of the meatus, and then giving the instrument a half turn,—I succeeded in first twisting on its own axis, and eventually bringing out, the grain of corn, which had, while in the ear, increased to one-third more than its natural size. Fortunately the membrana tympani, although highly inflamed, had not been ruptured, and the parts soon recovered.

A practitioner brought a child to my house, who, while playing with some pebbles, allowed a small white stone to slip into the external meatus six hours before. She had not complained of pain; but the friends became alarmed, and were most anxious to have the pebble removed, "lest it might get into her brain." He had, he said, used various instruments, but without success, to extract or dislodge the pebble. The child appeared then in great agony, and the countenance was highly characteristic of the distress experienced. There was considerable hæmorrhage from the ear, and the external aperture had already begun to swell. Upon examination I found the meatus extensively lacerated, and could perceive and touch a white, rough surface on its anterior wall, but as I felt sure that it was not the offending body, but the denuded bone, I recommended, strongly against the wish of my friend, a cessation of hostilities, at least until the hæmorrhage had ceased. A leech was applied to the margin of the meatus, and afterwards a poultice placed over the ear. Upon visiting the patient next morning I found that suppuration had been established during the night, and on syringing the ear with a little tepid water, the white quartz pebble presented at the external aperture, and was easily removed

with a forceps. Upon further examination, I found that the membrana tympani had been ruptured anteriorly, and that the bone was denuded for a considerable extent by the efforts made to extract the foreign body. The parts, however, eventually resumed their natural appearance.

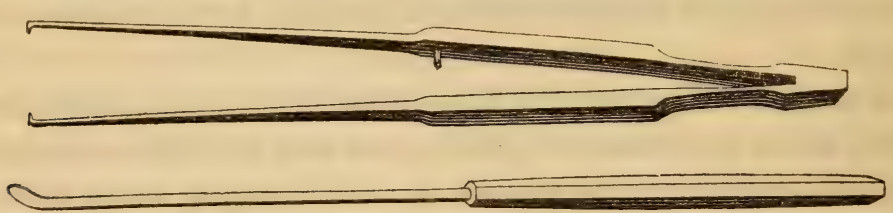
Bits of slate pencil, glass beads, cherry-stones, paper balls, and such like substances, are constantly introduced into the meatus; and it is remarkable, that the amount of suffering is no way commensurate with the size or character of the substance introduced. An intimate friend waited upon me late one evening in a state of great anxiety, accompanied by his little boy, who, he said, had put some glass beads into his ear in the morning. On inquiring the reason of his not applying during the daytime, I was informed that the child had not suffered the slightest inconvenience, and had forgotten the circumstance until bed-time, when he mentioned it to one of the attendants. The beads were extracted with facility.

A woman rushed into the hospital one morning in great alarm, stating that a pin's head had got into her ear, and that several persons had tried in vain to extract it. On bringing every portion of the meatus into view, I was enabled to assure her that her fears were unfounded, when she went away perfectly contented, and quite free from the pain she said she had previously experienced.

Rude efforts made to extract foreign bodies from the ear are as likely to cause mischief as these bodies themselves. The simplest, and often the most effectual, means of removing small substances from the meatus, is by syringing the meatus with plain warm water. If the offending body is not producing much pain or annoyance, it is scarcely fair to the patient to introduce some rough instrument into the passage, in the hope of dislodging it, without the use of the speculum, and bringing the foreign substance well into its field. The operator, merely dilating the external aperture with a divaricating speculum, gets a glimpse of the offending body,—a piece of slate pencil, a small pea, or a bead,—and passing down an ordinary dressing forceps, the blades of which so fill the aperture that he must then work by touch and not by sight, attempts to seize the smooth, round, slippery substance, which

is, at each effort, pressed down upon the membrana tympani, thereby not only eluding his grasp, but producing the most exquisite torture.

The head should be placed against some resisting body, or firmly supported in an operating chair, and the canal brought fairly within the field of the speculum; then the curette, or the small silver spatula figured below, acting either as a lever or a hook, will, if proper care be taken, in almost every instance dislodge the substance; and if it has got into a position where it cannot be well got at, syringing will often alter it so as to present some point where it may be either seized with the forceps without giving pain, or where we can easily introduce the curette between it and the wall of the meatus, and so extract it. Where we employ a forceps, that figured at page 57, or the one represented along with the spatula in the accompanying wood-cut, will be found useful.



The ingenuity and dexterity of the operator will, however, suggest the most feasible mode of operating.*

When it is remembered that death has frequently followed the introduction of a foreign substance into the meatus; and that epilepsy and many other distressing symptoms have ensued from the same cause; and when every practitioner who has met with cases similar to those detailed must have experienced some of the difficulties to which I have alluded, the foregoing observations will not appear too long.

Acids have been poured into the ear either by accident or design, and have produced frighful agony, and even death. How far poisons act when introduced through the meatus has not yet been fully determined; but the idea that they induced fatal results was current in England in the days of Shakespeare, and still prevails among the Irish peasantry.

* These instruments are represented three-fourths the natural size.

DISEASES OF THE CERUMENOUS GLANDS.

One of the most common and curable forms of deafness arises from impaction of the auditory canal with hardened wax. In cases of recent accumulation the dark, shining, convex end of the plug may be at once perceived on inspecting the meatus; in those of long standing, where the fluid portion has been evaporated, the offending material, mixed with hairs and scales of cuticle, has generally a concave surface, is not polished, and is seldom so dark as in the former case. At times the scale of hard wax is not thicker than a half-crown piece, and adheres firmly to the outer surface of the membrana tympani, causing impairment of hearing and most distressing tinnitus.

Cases of deafness proceeding from accumulation of cerumen are so numerous and so easy of cure that it seems unnecessary to occupy space in describing them, while so many other diseases of the ear present themselves more worthy of our attention, because less known and more difficult to treat. Yet let me say that the ability of making a diagnosis in such cases is not always possessed even by good surgeons and physicians. From week to week I meet with cases of deafness attended with tinnitus aurium, which have been ascribed to and treated as depending upon functional or organic derangements of other organs, the stomach and the brain in particular, and for which constitutional means as well as topical applications had been employed at considerable length, but which, upon examination, proved to be nothing more than firmly adhering pieces of hardened wax.

A medical friend in the country wrote to me to say he had become suddenly deaf in one ear; that he applied to a neighbouring surgeon who syringed him "for a long time;" that only a little wax came out; whereon he had taken aperient medicine, filled the meatus with cotton steeped in brandy, and applied a blister over the mastoid process. As I could not possibly advise him what to do without knowing what was the cause of his deafness, or, at least, having, by means of ocular inspection, a certain amount of positive and negative symptoms to judge from, he came to town, when I found a layer of hard dark wax pasted over

the membrana tympani, which was easily lifted off with a spatula, but which no syringing would have removed. All his symptoms immediately disappeared.

If we examine the membrana tympani after the offending substance has been removed, we will in most cases find it vascular, and the lining of the canal pinkish. To judge, however, from this state would be most erroneous, as the irritation produced by the removal of the wax necessarily gives rise to the vascular condition alluded to. Persons who perspire much about the head seem to be more liable than others to collections of cerumen.

Unless illuminated by some means, natural or artificial, the external auditory passage is a dark cavity, and, without proper inspection, it is not possible to know, by any set of symptoms of which the patient himself is conscious, whether his disease proceeds from the simple mechanical impediment of a plug of wax, disease of the middle ear, or threatenings of serious mischief in the brain itself, because the two most prominent symptoms, deafness and tinnitus aurum, are common to all three, and to many other diseases of the ear also; in the same manner as we find impaired vision and muscæ common to so many diseases of the eye, as well as symptomatic of cerebral and other affections. I see few cases of incipient cataract in the upper ranks of life which have not already undergone a little doctoring, under the impression that the disease depended upon the state of the stomach ; and blue pills, bitter mixtures, and dietetic regulations, have had full sway. But, where so much has been achieved for medical science during the last twenty years by greater attention to diagnosis, thus rendering the healing art a more accurate science than heretofore, I do not think it is too much to ask the practitioner to possess himself of a small tubular speculum, and to take a peep at the state of the parts he is prescribing for, before he resorts to the routine treatment alluded to. This is, properly speaking, one of the errors of omission. Now I will state one of commission. A patient is seized with deafness and a singing noise in one of his ears. The medical attendant, supposing it might be wax, squirts hot water with a powerful syringe into the auditory passage for half an hour together, and as nothing comes

out, he syringes the harder. All this time the patient laboured under inflammation of the drum of his ear, which, I need not say, was not improved by the treatment adopted. Let me entreat of my readers never to syringe an ear, nor to drop any stimulating application into it, until they have carefully examined the state of the parts, and assured themselves of the presence of wax or other foreign body. My advice was sought by an officer, for deafness caused by thickening of the membrana tympani. On asking his medical attendant what treatment he had employed, he said, "I syringed him every day for three weeks, but nothing came out"!

The cerumenous glands are more liable to morbid changes than the profession are aware. The moment an inflammation is set up in the neighbouring structures they cease to secrete. When otorrhœa is present, their function seems also suspended. At times they secrete a thin, light-coloured, honey-like cerumen, so quickly and in such quantity as to pour out of the external meatus. This I have chiefly seen in weakly females, and often occurring as a sequel to some febrile attack. It is the analogue to inflammation of the Meibomian glands. From children of a year old to persons of extreme age we meet with collections of hardened wax in the ear, and are called upon to remove them; but they are more frequently seen in middle life than at any period antecedent thereto. They are not always accidental, as we learn from the same person returning again and again, at intervals of two or three years, to have them removed. The vitiated secretion probably depends upon some chronic inflammation of the cerumenous follicles themselves. The wax is generally darker in colour than natural, at times resembling pitch in its tenacity and hue. In other cases, it becomes as hard as a piece of mortar or concrete, and forms an accurate cast of the meatus auditorius externus, feeling to the touch of an instrument like a stone or foreign body. As soon as this has occurred hearing is much impaired; but from time to time the patient feels a slight report in his ear, particularly after eating or moving his jaws, and then the hearing is much improved for a short period. The improvement is caused by the motion of the external portion of the tube slightly disad-

justing the cork of wax, and so allowing air and sound to be temporarily transmitted to the drum-head; but the improvement is lost as soon as the plug has regained its former position, or an additional deposit of wax fills up the space, and again occludes the air and sound. This circumstance, trivial as it is, is worthy of note, because something very similar takes place in another disease of the ear, arising from a totally different cause. In catarrhal inflammation of the middle ear, with thickening of the lining membrane, or mucous collections within the Eustachian tube, or the cavitas tympani, we perceive, as perhaps many of us have ourselves experienced when labouring under catarrh or influenza, a sudden report, as if something gave way in the ear, followed by an immediate accession of hearing. In some cases of complete impaction of wax, particularly where it is very hard and of long standing, the patient does not hear the watch, even when held to the auricle, pressed against the mastoid process, or laid upon the forehead—symptoms generally indicative of some great lesion of the internal or middle ear, or paralysis of the auditory nerve;—yet as soon as we have removed the mechanical impediment, the hearing becomes exalted to a degree which is painful to the patient to bear. I cannot but think that, in such cases, the loss of power has arisen from the pressure exercised by the foreign body upon the tympanal membrane, and, through it, transmitted by the chain of ossicula to the labyrinth.

Squirting hot water into the auditory passage, even with the most powerful syringe, will not always succeed in removing the offending body. In fact, if not properly done, it rather increases the impaction. I have, however, seldom met a case in which, with a little care and patience, I could not remove the wax at one sitting. One of the cases which proved an exception to this was in a person who had a natural hour-glass contraction in the middle of the passage, and another where there was an exostosis the size of a split pea in the same locality. The best syringe to employ is that figured at page 77, worked with the right hand, while the left grasps the top of the helix, and, by drawing it slightly upwards, outwards, and backwards, assists to straighten the meatus, and thus facilitate the exit of the plug of hardened

cerumen. The jet of fluid should not be directed point-blank against the cork of wax, but rather to its edges, where it is attached by a number of hairs, and is often intimately united with the cuticle. From time to time we should introduce the speculum and see what progress is being made. The fine long-bladed forceps may sometimes be slipped down upon the offending body, and it can be thus withdrawn; or, what I find much more useful, the small silver spatula already described, and which, acting as a lever, moves the plug, and so allows the water to get behind it and force it out. Another instrument very useful in such cases is a fine blunt curette, made of silver, and with the end bent for about a line in length at a right angle with the shaft, referred to at page 179. By slipping this down between the cork of hard wax and the wall of the meatus, and then, when it has proceeded some distance, giving it a half turn, so that its point fixes in the plug, the latter may often be removed *en masse*. Care must, however, be taken in using these little instruments not to abrade the skin, which at the lower portion of the meatus is very delicate, and apt to bleed upon the slightest irritation.* We read in books on aural surgery, and in lectures and details of cases given in periodicals, of various substances employed for the purpose of softening wax—the last of which was glycerine; but, if attention is paid to the directions I have now given, some patience exercised, and that we proceed with care and delicacy, I do not think we need often have recourse to any of the nostrums recommended for softening and removing wax. Should we, however, at first encounter any difficulty, or the patient experiences much pain from our manipulation, it is better to desist, and drop a little warm oil into the ear once or twice a day, or keep a bit of cotton moistened with oil in the passage, until the wax has been partially softened.

Simple removal of the wax will generally restore the hearing at the moment, but the tinnitus often remains for some time after. As a consequence of impaction of the auditory passages with ce-

* The ear-pan figured at page 76 will be found a very convenient, cleanly instrument. I have latterly placed the perforated division across one end instead of along the length of the pan.

rumen, producing thickening of the cuticular layer of the membrana tympani, the two following Cases may be cited:—

L. W., a male, aged 40 (No. 14 in the Registry), applied on account of deafness in his left ear of some weeks' standing, but which had recently increased very much. Complains of noise like that of a boiling kettle. Hearing distance, two inches; says it varies from time to time, but that it was always better after eating until lately. Occasionally he experiences a loud noise, as if a report took place in his ear, after which the hearing is improved. His disease has been of twelve months' standing. Upon examination, I found the external auditory passage filled to its aperture with hard, brownish, inspissated cerumen. It is so hard, that percussion with a probe conveys the sensation to the fingers as if struck against a body as firm and resisting as stone. Numerous short but firm hairs grow around the external aperture, and some of the more internal ones are probably mixed up with the hardened cerumen, and so assist to keep it immoveably fixed in its place. The mere projection of a stream of warm water from a syringe will not easily remove such a thoroughly impacted mass as this. It must be assisted out with the spatula, slightly bent at the end, like the old lever used in midwifery; but the ear should be syringed from time to time as we proceed with our manipulations. When well loosened, I removed it *en masse* with a pair of fine forceps, and perceived that with it came out a large collection of hairs, which had become entangled within it; and that all its lower portion and its extremity was covered over with a layer of soft, white, thickened cuticle, the natural lining of the surface with which it has been so long in contact, thickened and separated by the pressure exercised upon it by this foreign body. Immediate relief to all the symptoms under which this person laboured was experienced by the removal of the foreign substance. The hearing increased to twelve inches, and the noise lessened considerably. Upon inspection through the speculum, the membrana tympani was seen whitish and succulent, and having the parboiled appearance of the piece of cuticle which had been removed from it. Several large red vessels also ramified upon its surface, and coursed along the insertion of the malleus in particular. This condition was,

no doubt, caused by the pressure of the accumulated and hardened cerumen; but in a few days the part recovered its natural character.

Several times during the removal of this wax the patient was seized with a fit of spasmodic coughing, apparently caused by some irritation in the larynx. I have already alluded to this peculiar phenomenon at page 77. Since that portion of this work was printed, I met the following observations in the British and Foreign Medico-Chirurgical Review, vol. xvii., p. 414:—

"Pruritus of the external meatus auditorius, from hyperæsthesia of the auricular branch of the pneumogastric, is sometimes observed, and is accompanied by cough and vomiting. This connexion between the ear and the stomach and lungs is not sufficiently remembered by modern practitioners. Arnold mentions an interesting example of chronic vomiting in a child, which long resisted all curative means, but which was effectually removed by removing a bean from each of the child's ears that had slipped in while at play. Cassius Medicus has for one of his problems,—Why does irritating the ears, as, for example, with a speculum, cause sometimes a cough, just as if the trachea was irritated?"

No. 5 in Registry, M. B., aged 25, a literary teacher, complained of general deafness, with singing noise in both ears. Upon inspection, the external auditory passages were found to be corked up with hard inspissated cerumen. This was rémoved by syringing with warm water in the ordinary manner, upon which the hearing was quite restored in the right and partially in the left ear. A few days having been allowed to elapse, in order that the meatus and external surface of the tympanal membranes might regain their ordinary appearance after the vascularity produced by the pressure of the wax, and the excitement and irritation caused by its removal had subsided, this case was again examined.

Right Ear.—Hearing distance, two feet and a half; the meatus dry, but no appearance of disease presented upon inspection with the speculum.

Left Ear.—Hearing distance, four inches; walls of meatus covered with flakes of thickened whitish cuticle, which presented

the appearance of partial maceration, and nearly filled up the cavity. Upon removing these with a forceps, the surface beneath presented a florid red colour. The membrana tympani was thickened throughout, and exhibited patches of vascularity, which deepened into a continuous red surface above and behind the insertion of the malleus. He had a confused rustling noise in this ear. The surface of the meatus and the membrana tympani was washed over with a solution of nitrate of silver, five grains to the ounce; a dose of aperient medicine was prescribed for him, and he was directed to wear a bit of cotton wool in the external aperture, so as to exclude the cold air. In ten days this case was again inspected. The meatus on the left side had resumed its natural colour, but was very dry and somewhat scaly. The tympanal membrane had cleared considerably since last report; the lower portion in particular had become quite free from vascularity, but a few large vessels could still be observed coursing behind the manubrium. He could inflate the tympanal membrane after the manner described in the former cases. The hearing distance had increased to fourteen inches; the noise had very much lessened, and occasionally intermitted altogether. The surface of the membrana tympani was again washed over with the solution of caustic, and the walls of the meatus smeared with brown citrine ointment, applied in a melted condition.

The chronic inflammation of the entire external auditory aperture in this case appears to have been the result of mechanical pressure, and the irritation of the hardened wax.

INFLAMMATIONS OF THE EXTERNAL AUDITORY CANAL.

Inflammations of the external meatus and auditory canal are of very common occurrence. To follow out the anatomical principle of classification pursued by some authors, these inflammations should be divided according to the structure in which they have their seat; but, as all practical surgeons are well aware, it is no more possible to do so than it is to limit the spread of these inflammations. Thus, what may commence as a simple inflammation of the tegumentary tissue, may end in caries of the bone and

inflammation of the brain or its membranes. I have, therefore, adopted the arrangement specified in the nosological chart, and of which the following is a description:—

Abscess in the external meatus is one of the most painful and frequent inflammations of the external ear. Generally it is not like the diffused form, the result of cold, but seems to be induced by some peculiar state of the constitution, and very often appears either as the sequel to or a concomitant of boils on other parts of the body, particularly about the neck. These abscesses are more frequent in females than in males; and, I am inclined to think, appear oftener in persons of the upper walks of life than those in the lower. They may be seated anywhere all round the external meatus, but occur more frequently in the anterior and posterior wall than in the roof or floor. They may not exceed a pea in size, or they may advance to that of a large marble, or even a walnut, when, if seated anteriorly, they spread in front of the tragus, and if posteriorly, they present a considerable protuberance over the mastoid process, so as to be distinguished with some difficulty from inflammation, and deposits of pus beneath the periosteum in that situation. They seldom or ever appear singly: there is generally a succession of them, and of this the patient should be informed on first applying for advice. There is not much redness of the part; the heat is more of a burning or itching character. The pain, however, is most intense, aggravated by the slightest touch, and always increased at night, and also by any motion of the jaw. In addition, there is always more or less tinnitus, and a feeling of stuffing, buzzing, and throbbing in the ear. The fever is at times considerable—much more so than would be expected from so slight a cause, and characterized, not so much by alteration in the circulation, as by evening paroxysms, heat of skin, restlessness, and great anxiety of countenance. From the structures in which they are placed, these abscesses are generally a long time coming to the surface, and they almost invariably point internally, or toward the centre of the external orifice. The contents of each abscess—which is the analogue to a stye upon the eyelid, but, owing to the structure in which it is placed, it is far more painful—consists of thick yellow pus and a hard core of dead cellular membrane;

the former is sometimes only a drop, at other times it is as much as a drachm.

The local treatment, most efficacious for preventing suppuration in these parts when inflammation has been set up, is the application of the solid nitrate of silver so as to blacken the skin. As soon as we believe matter has formed, and come some way to the surface, but not till then, we should make an incision with a very small double-edged knife. At the same time fomentations and poultices, and holding the ear over the steam of hot water, will afford relief both before and after the matter has been evacuated.

Few diseases of the ear require more careful constitutional treatment than this. After attention to the state of the digestive organs in the usual fashion, the use of bark, with either the liquor potassæ or Brandish's alkaline liquor, will assist to prevent a recurrence of these abscesses. While the abscesses in the external meatus are appearing in the manner described above, there is generally some subacute inflammation of the lining of the whole canal, attended with a whitish discharge, and in some cases the membrana tympani is itself inflamed, so that we should, as soon as the parts will permit, examine the condition of that structure. If inflamed, leeches are indicated; but unless applied in the very early stage of circumscribed inflammation, they seldom prevent the formation of matter.

Diffused inflammation of the external meatus is a matter of much more serious consequence than either the profession or the public are aware; for, frequently as it occurs, and lightly as it is treated, it generally ends in the establishment of a disgusting disease—otorrhœa, which always impairs the hearing, oftentimes leads to total deafness, and, in some cases, ends in death. Yet how frequently do we hear practitioners speak of the patient having "only a slight discharge from the ear." At times the symptoms of inflammation of the lining of the meatus are so slight, and produce such little uneasiness, that the patient first becomes conscious of his disease by feeling something wet in his ear, when upon applying the finger, or a towel, he discovers that a discharge of thin, whitish, muco-purulent matter has been established; or in infants and young children, about the period of dentition, the

nurses and attendants observe the flow of matter as the earliest symptom of the disease. This is the subacute or *catarrhal inflammation* of the dermis, and the external layer of the membrana tympani, which is always attended with otorrhœa, and which frequently remains in a chronic condition for years. The state of the external aperture on the first onset of the disease, and before it has become thickened or excoriated by the discharge, is normal; but within, the cuticle is white, pulpy, and detached, and the skin beneath it is usually of a pinkish colour. This is a disease of infancy and youth, and is one of the most decidedly strumous affections with which I am acquainted, not only from its appearing in persons of well-marked scrofulous character, but from its being so frequently a concomitant of other scrofulous affections, particularly of the lungs. Out of 2385 cases recorded in the Table at page 102, there were 516 of chronic otorrhœa, the males predominating somewhat over the females.

Acute inflammation diffused over the external meatus may be either idiopathic, as from cold; traumatic, from a foreign body or any irritating substance introduced into the meatus; or specific, as when it occurs in the course of some of the exanthematous fevers, is produced by infection with gonorrhœal matter, or is attended by such other symptoms in persons where there is a decided diathesis that it may be termed rheumatic. This latter need not end in suppuration or otorrhœa; the previously specified forms generally do. To these different forms of inflammation, classified in the nosological chart at page 147, I have added that of periosteal, to define that particular kind of inflammation usually accompanied with otorrhœa, which, sooner or later, spreads to the periosteum and the bone of the auditory canal, and from thence to neighbouring structures, often producing fatal consequences. When once a discharge is established, no matter from what cause, but more particularly when it results from subacute or chronic inflammation of the lining of the meatus, and the external surface of the membrana tympani,—which, in such cases, generally becomes muco-secreting,—we have then a special disease to treat, denominated external otorrhœa, which shall be considered in the chapter upon that subject.

Acute inflammation of the meatus can scarcely exist, or proceed to any extent, without engaging the external layer of the membrana tympani. The inflammatory action may be limited to these two situations; where known, the disease is characterized by violent pain and fever, it seldom is so, but usually engages the mucous membrane of the cavity of the tympanum, as is proved by the frequent rupture of the membranous diaphragm between these two portions of the auditory apparatus. Such is generally the case in those inflammations attending eruptive fevers, scarlatina in particular, where the mucous membrane of the throat and ear, as well as the glandular structures of the neck, are, in the severe instances of that affection, so frequently engaged; but in these latter I am inclined to think the disease spreads to the auditory organ more frequently from the throat than the skin.

Acute inflammation of the meatus is characterized at first by dryness, itching, and heat of the part, gradually increasing to a dull aching, and eventually to an acute lacerating pain, generally increased at night, and in some instances amounting to insufferable agony, with loss of rest, fever, and even delirium. The lining of the meatus is swollen: at first dry and pinkish, then white and muculent; and at that stage I have on several occasions seen the whole of the bony portion of the tube and the external surface of the membrana tympani coated with a layer of plastic lymph. In a short time a sero-mucous or muco-purulent discharge is established, or yellow pus pours from the meatus, and relief is then generally experienced. Attendant upon these feelings and appearances there is, particularly in rheumatic cases, a sensation of soreness over that side of the heud, and all the symptoms are increased by sneezing, coughing, chewing, or moving the jaw in any manner. As, however, the hemicranial pain, and many of the other symptoms detailed, are common to inflammations of the cavitas tympani and general otitis, it is often difficult to distinguish external from internal inflammation of the ear. The following case of acute inflammation of the external auditory tube and membrana tympani (No. 16 in the Registry), is characteristic of this affection:—

T. S., aged 46, a shopman, complains of deafness in his left

ear, of a fortnight's duration, accompanied by a buzzing noise and throbbing. The disease commenced late in the evening, with severe pain, which continued all night, and which, although mitigated, has never entirely ceased since, but is always most distressing at night. Upon the fifth or sixth day he perceived a "slight moisture" in his ear, but was not conscious of any sudden burst, or a feeling as if something had given way within. The external meatus and auditory tube, as well as the surface of the membrana tympani, are coated over with a tenacious muco-cerumenous discharge, upon the removal of which the entire surface brought into view appears of a florid red, becoming pinkish and spotted with white on the face of the membrana tympani. Flakes of cuticle adhere to the walls of the canal. The spots on the membrana tympani appear to be patches of lymph effused on its surface; they are more of a yellow colour than the specks of cuticle on the tube. The membrana tympani is still imperforate. We occasionally find the whole surface of the tympanal membrane covered over with a sheet of lymph like that which lines the trachea in cases of croup. He cannot hear the watch even on touching. On the right side the parts are healthy, and the hearing good. The treatment recommended to the patient has only aggravated his disease,—brandy and oil, laudanum, hot salt, and various stimulating applications, having been poured into the meatus.

This is a case too manifest to be mistaken; and, from the total loss of hearing upon the left side, it is probable that the inflammatory action has extended to all the layers of the membrana tympani, and has also passed into the cavity of the middle ear. Had it commenced in the latter, the pain and attendant fever would have been greater, and, on suppuration taking place, the membrana tympani would probably have been ruptured to allow the exit of the matter, and the case would now be one of internal otorrhœa, with perforation. Cases of this nature are very common during the winter months, or when cold east winds prevail in March and April; and are frequently induced by travelling upon the top of a coach, sitting opposite an open door or a broken window, or being exposed to a draught of cold air in any situation. I am frequently consulted by Roman Catholic clergymen

during the season of Lent, for inflammation of the ear acquired while sitting in the confessional-box, often for hours together, in cold, exposed places of worship, with the ear applied to a small aperture through which the wind is playing. In the foregoing case, local depletion, continued counter-irritation, and alterative doses of mercury, restored the parts to a healthy condition, and the hearing returned. In some cases of inflammation of the auditory canal, the auricle is hot and swollen; but in no instance does it ever assume the œdematous character which the eyelids present in severe ophthalmia.

The treatment of acute inflammation of the external auditory conduit should be strictly antiphlogistic. Local depletion, by means of leeches applied round the meatus, or the neighbourhood thereof, after the manner described at page 85, is indicated in almost every case. Purgation is always attended with advantage, and the patient experiences great comfort from the application of heat and moisture. Mercury is seldom indicated unless when the membrana tympani is deeply implicated. Counter-irritation should follow, but unless in mild cases, never precede, depletion. Astringent lotions should be used with caution until the disease is in a subacute or chronic form, when it becomes a case of ordinary otorrhœa. I have seen small granulations sprout from the lower portions of the canal within eight or ten days after the first accession of inflammation of this portion of the ear, but generally speaking they occur at a much later date, and are more usually attendant on disease of the deeper-seated structures. Superficial ulcers form both on the dermal lining of the meatus and the external layer of the membrana tympani.

Continental authors have enumerated *gonorrhœa* among the causes of inflammation and otorrhœa from the external meatus, and upon the authority of writers I have inserted this disease in the nosological chart, although I myself have never met a case that could be fairly traced to it, either by metastasis or the direct application of specific virus to the part. Mr. Harvey, of London, wrote an essay on venereal affections of the ear, in the London Journal of Medicine for February, 1852, in which he alludes to the analogy between ophthalmia neonatorum and infantile otor-

rhœa produced by the contagion of specific matter. I must, however, for my own part, confess, that I am unacquainted with that "obstinate form of infantile otorrhœa which occurs shortly after birth, not unfrequently destroying the organ, and producing as a consequence both deafness and dumbness for life," alluded to by the author. In order to trace it to infection by direct contact, the disease ought to appear within the first fourteen days at the latest after birth, whereas every accoucheur, or physician familiar with the diseases of children, is well aware that the muculent discharge of infants does not in general appear until after the second month, and still more frequently not until dentition commences. The case related by Mr. Harvey does not support his hypothesis, or bear scrutiny. A man labouring under gonorrhœa and hernia humoralis is "seized with intense itching in his ear, accompanied with paroxysms of pain; and shortly afterwards there issued a profuse yellowish discharge." To account for the disease the author says, "Let us suppose the man's finger to have been soiled with the urethral discharge, and that on an occasion of an intense degree of itching in the external ear (the very first symptom complained of by the patient), he had thoughtlessly and with some violence thrust his finger into the meatus, possibly abrading the membrane with his nail." He also quotes Lincke's description at length, but it does not contain any one diagnostic wherewith to distinguish this form of inflammation from that arising from any other cause, and we require experiments to establish the fact that the external meatus is susceptible of gonorrhœal infection.

Whatever may be the cause of the inflammation in the lining of the meatus, the diseased action, once set up, may spread sooner or later to the periosteum and the bone, causing necrosis, exfoliation, cerebral disease, and death. It is, therefore, a disease at all times demanding the serious attention of the surgeon, and requiring prompt and energetic measures for its arrest. Mr. Toynbee, in an elaborate and ingenious article in the Medico-Chirurgical Transactions, vol. xxiv., has endeavoured to show that disease of particular portions of the ear are propagated from or give rise to disease in particular portions of the brain; thus, when inflammation or its results is seated in the external meatus or mastoid cells,

the cerebral affection will be found in the lateral sinus and cerebellum; from the tympanic cavity, disease is propagated to the cerebrum; and from the labyrinth to the medulla oblongata and base of the brain. The author has collected and arranged in a tabular form a number of cases of death produced by extension of disease from the ear to the brain, or its membranes, in which post-mortem examinations were made; but although these cases, and many others well known to surgeons, and several additional ones recorded by members of the profession in this city, to which I shall have occasion to refer in another place,—all prove the fatal nature of many of these aural affections,—they certainly do not establish the theory "that each of the cavities of the ear has its particular division of the encephalon to which it communicates disease."

CUTANEOUS DISEASES OF THE MEATUS.

Diseases of the skin, particularly *herpetic and eczematous eruptions*, extend from the auricle into the meatus; or they may be seated in the latter alone. In either case the treatment is similar. If allowed to proceed unchecked, they produce thickening of the lining of the passage, lessening its caliber, and in time steal over the external layer of the membrana tympani. As the result of chronic inflammation, the lining of the meatus becomes thickened, and may sometimes be peeled off like the detached cuticle of a blister or burn upon any of the exposed surfaces of the body. There is a thick pasty matter, not unlike the softened cuticle which may be scraped from the soles of the feet, sometimes coating over the passage: and occasionally the whole thimble-like cuticular lining of the meatus comes out *en masse*. In all these cutaneous affections, in addition to the treatment already referred to when they are seated in the auricle, great benefit will be derived from the application of a solution of nitrate of silver,—ten grains to the ounce; and subsequently, when the lining has become more healthy, the use of the citrine ointment, referred to at page 171. Bell, in his work on Lues, speaks of deafness produced by a "scruffy eruption," and sometimes ulceration of the external auditory passage, occurring as a consequence of that disease; but his descrip-

tion is not sufficiently accurate to be depended upon, and has not been confirmed by subsequent observers. No doubt, cutaneous syphilitic disease will extend by ordinary continuity of surface into the meatus, but as a special form I am unacquainted with it.

I have seen cases of intolerable *itching of the meatus*, with a dry branny state of the cuticle, lasting for months, and giving rise to heat and redness of the auricle. Paroxysms of the disease come on at stated periods, generally in the evening. Cases of this nature, and all other diseases of the meatus, attended by extreme dryness and an unhealthy state of the cerumenous secretion, will be benefited by the application of glycerine, and some by the solution of gutta percha in chloroform.

The amount of hair growing round the meatus and attached to the posterior surface of the tragus is very various. Sometimes, particularly in persons from fifty to sixty years of age, *the vibrissæ fall out*, and resting either on the meatus or membrana tympani, cause intense annoyance, and at times produce increased redness of the lining of the passage. Syringing affords but little relief, for the wet hairs only adhere to the parts more intimately. The meatus must be carefully inspected with the speculum under strong sunlight, and each hair gently removed with a long fine forceps. It requires some delicacy of manipulation to lift a hair from off the membrana tympani without giving the patient pain; but it is the only effectual remedy.

Ulceration of the meatus is of itself a rare disease; but it is a frequent concomitant of other affections, such as otorrhœa, or the irritation of substances introduced either by accident or for curative purposes. It often attends chronic erysipelas, and also condylomatous growths at the orifice of the canal. Extreme cleanliness, mild astringent washes, the application of nitrate of silver, together with the constitutional treatment recommended at page 170, will generally cure cases of this description.

MORBID GROWTHS AND ALTERATIONS IN THE EXTERNAL AUDITORY CANAL.

Variations from the normal caliber of the external meatus may arise from a number of causes,—viz., collapse of the flexible por-

tion of its walls, of which an example is given below; or the obverse state, in which the external aperture is preternaturally wide —a common consequence of long-continued otorrhœa; stricture, either congenital or acquired, in its middle part, and also morbid growths, such as polypous, bony, or other tumours.

No. 20 in the Registry is a case of *closure of the external meatus;* in T. S., a female, aged 54, who says she became deaf gradually during the last three or four years. Has tinnitus aurium; but no pain or soreness in the ear. There is little to be learned from the history of this case; but a glance at the external ear affords a tolerably good idea of the cause. Upon looking at the meatus we perceive that it has lost its usual ovoid shape, and has become a mere elongated slit or fissure marked by a dark line where the incurvated edges are in contact. Upon drawing forward the tragus, we rather increase the defect, but by grasping the auricle immediately above the anti-tragus, and drawing it outwards and a little forward, we can to a certain extent restore to its natural size and position the external auditory aperture. The hollow formed between the tragus and the external meatus is much larger and shallower than natural; and on pressing with the finger in front of the tragus and beneath the zygoma, where the skin is rather corrugated, we are unable to push the tragus backwards into the concha so as to cover the meatus externus, to which in normal cases it ought to act as a sort of operculum. Upon examination with the speculum, we find the flexible walls of the auditory tube compressed, the lining of the passage white, and its cuticular investiture thickened as if by maceration, and detached in patches, while a slight, whitish, curdy discharge collects round the edge of the tubular speculum. The tympanal membrane is white, and apparently thickened. There is no evidence of cerumenous secretion in any portion of the passage.

Upon enlarging the external meatus, either by the means first pointed out, or by the introduction of the speculum, the hearing is increased. She can now perceive the ticking of the watch at six inches; previously she only heard it when pressed against the auricle.

Closure of the external meatus may arise from a variety of

causes, of which I possess examples in an extensive series of drawings. In the instance detailed, it does not seem to be the result of any inflammatory process, but appears to have been caused by some force gradually exerted upon the tragus, drawing its point forward toward the cheek, and pressing its base backwards,—possibly permanent spasm of the tragicus muscle. It is a very slow and gradual process, and is, therefore, seldom attended to by the patient until complete closure of the meatus ensues. The deficiency of cerumen, the thickened cuticle, and the slight discharge observed in the passage, are the result, not of the original disease, but the subsequent closure and pressure of the sides against each other. It is a disease of middle or advanced age; and although it attacks one ear first, it generally appears in that on the opposite side. It is most difficult to manage. I have had thoughts of making an incision in front of the tragus, so as completely to divide any muscular fibres which might have produced the deformity; but I fear that plan would not be attended with much success, for I have, from long experience, remarked that when once any of the free cartilages, as the eyelids, nose, or auricle, become viciously bent or distorted from their natural position or curvature, that it is almost impossible to restore them by any effort of art. I have used tents made of compressed sponge for the purpose of gradual dilatation, but I cannot say that I have effected much thereby; they should, however, be given a fair trial in every case. The canal ought to be cleansed from those impurities which collect therein, and the parts washed over with a strong solution of nitrate of silver, and a fresh tent should be introduced every night, and removed in the morning. With intelligent persons, in the upper ranks of life, this plan of treatment, if proceeded with for a sufficiently long time, will be attended with benefit; but with careless, stupid people, among the lower orders, who pay little attention to cleanliness, it has but a slight chance of success. Defective hearing arising from this apparently mechanical cause is one of the few diseases that may be relieved by the introduction of a small metallic tube shaped like a wine-funnel. We see those constantly advertised as a means of relieving every description of deafness. I need not say that,

from the rarity of the peculiar disease to which they are applicable, how very few cases they can afford relief to. As, however, they are silver-gilt, are sold in very neat morocco cases, and cost a guinea, they serve the purposes for which they are advertised: they do not cure; they only sell. Baron Larrey, the inventor of these tubes, supposed that the disease which they are intended to remedy was caused by loss of the molar teeth of one or other maxilla in early life, when he says there results a "gradual displacement, upwards and backwards, of the condyles of the lower jaw-bone, which sink into the glenoid cavities of the temporal bones so as to become lodged at the bottom of the articular cavities, beyond the Glasserian fissure, and before the meatus externus, the parietes of which will then be depressed in the same direction; the auditory passage is gradually obliterated, or undergoes such an alteration that the rays of sound can no longer reach the tympanum, from whence results deafness." I have seen cases of this disease, however, in which the molars had not been lost.

Several years ago I had under my care a case of this description, in a very intelligent old gentleman, and having made an accurate wax cast of the concha and meatus, while the latter was drawn open, as already described, Mr. Grimshaw made for him a silver tube, which, fitting accurately to the parts, gave no inconvenience, was not remarkable, and very much improved the hearing. Pads have been constructed to fit behind the ear, and press the auricle forwards, but they do not afford the desired relief. Persons who are aware of this cause of their deafness do not, when conversing, place the half-closed hand behind the auricle, in order to collect sound, but very soon learn how to enlarge the meatus, by drawing the auricle outwards and a little backwards.

In ordinary cases of otorrhœa, particularly where the discharge is profuse, the meatus is often rather larger than natural, and the excoriations, which sometimes occur where the matter is of an ichorous character, being always more or less moist, and not forming crusts and scabs, do not produce any contraction of the external aperture; but other cases present where the meatus is closed by morbid growths, of which the following instance is an example.

Condyloma of the external meatus is a rare form of disease. M. D. L. (No. 21 in Registry), a female, aged 25, suffers from deafness, tinnitus, occasional pain, fœtid and sometimes bloody discharge from left ear, for eight months; is otherwise healthy; attributes her affection to cold. The external meatus is completely closed by several condylomata which grow around its margin, but particularly from its lower edge. They are rather sensitive to the touch, lobulated on their surface, project a considerable distance beyond the margin of the aperture, and are a little more florid in colour than the natural skin. When the tragus is pressed backwards with the finger, a muco-purulent offensive discharge exudes between these growths. It is not possible to insert even a small-sized speculum into the meatus without causing great pain and irritation. She can only hear the watch on touching. The right ear is normal. The excrescences were touched with solid nitrate of silver, after which a poultice was applied. The subsequent treatment consisted in washing over the morbid growths with a strong solution of nitrate of silver every second or third day, and, in the intermediate time, keeping a dossil of fine lint, wet with diluted liquor plumbi, applied to the concha; besides the internal administration of Plummer's pill and sarsaparilla. By persisting in this treatment for upwards of two months, the condylomata disappeared, leaving the meatus natural, when the membrana tympani was found unimpaired, and the hearing was restored.

The following case, No. 24 in the Registry, presented an uncommon form of *tumour in the meatus:*—

M. N., a female, aged 47, has been deaf of the right ear for many years, and is much annoyed by itching and a stuffed feeling in the meatus. A tumour, in shape, size, and colour resembling a half-ripe mulberry, occupies the anterior and lower edge of the meatus, and extends some way into the auditory tube, which it almost completely blocks up. It is not unlike that disease known here as " button scurvy," and to which the late Dr. Wallace of this city gave the name of *morula.* It is attached by its broad base throughout its whole extent, and has neither enlarged nor extended for the last five years, during which time I have been in the habit of examining it occasionally. The patient never had otor-

rhœa; and there is no discharge now present, but at times the tumour becomes painful and irritable, and then its colour deepens from a florid red to a purple. It is of a firm consistence, corrugated on its surface, and has an unyielding feel, quite unlike a nævus, for which at first sight it might be mistaken. I have not meddled with this tumour, as I once saw, and have described at page 206, an affection somewhat similar in external appearance, in a lady about this woman's time of life, end in malignant disease, apparently hastened by treatment.

We meet with various other growths in the external meatus and auditory tube, independent of polypus or other morbid products, resulting from inflammation or its consequences. One of the most frequent of these is *exostosis*, of which I have seen very many examples. The projection generally grows from the posterior edge of the osseous portion of the tube, and slowly, but gradually, projects forwards, so as to leave but a slight crescent-shaped fissure between it and the anterior wall of the meatus. The integuments covering such growths are generally very smooth, white, and polished. I have seldom seen this disease affect both ears, but I have often remarked it in connexion with inflammatory affections both of the external tube and the membrana tympani. Autenrieth has given an account of one of these growths; and in 1849 Mr. Toynbee communicated a valuable paper on the subject to the Provincial Medical and Surgical Journal, giving an account of twelve cases. That paper is illustrated with woodcuts representing views and sections of a portion of the temporal bone in a dry state, exhibiting in particular the mastoid process, and a section of the bony meatus, in order to show the position of the encroachments made by these morbid growths. I do not think it at all unlikely that the temporal bones of the various persons alluded to in Mr. Toynbee's paper may, after death, present the appearances which he has delineated: and the diagrams showing the form of the meatus, and the amount of bony growth therein, are, no doubt, perfectly allowable: but I am not so well satisfied with illustrations of any kind except such as are absolutely drawn from nature. The treatment recommended for these growths is the application of iodine: when, however, the disease has advanced to any extent, I

have not much faith in any remedy; but in the early stage, when the exostosis is probably the result of chronic periostitis, local depletion, counter-irritation, and mercurials, will arrest its progress. Fortunately, these little bony nodules, which very much resemble the excrescences which grow from the beech tree, are usually of very slow growth. I know one which has not, apparently, increased during the last eight years. On the contrary, I may mention having just seen a case, in consultation with Dr. Morgan, in a gentleman who asserts that he heard quite well with both ears twelve months since; he then began to lose the hearing of the right, which is now quite gone. A few months ago the left was similarly attacked, and he can only hear with that ear by inserting the finger for some distance into the concha, and forcibly drawing the tragus downwards. Being much occupied with business, he paid no attention to his disease; at least he sought no advice for it until the past week. Yet this is a gentleman, I am told, of considerable professional acquirements, and conducting an extensive business. It seems almost incredible with what apathy and indifference men reputedly clever will permit their hearing to be lost without making any effort for its restoration. But, although they have allowed the day of grace to pass by, many of them are not slow in enlightening society upon the subject of the impossibility of curing deafness, or their complete want of faith in medicine. In the case of Mr. B., just alluded to, the external meatus on the right side is completely closed by a hard, smooth exostosis growing from its posterior bony wall, and filling up the canal so perfectly that no vestige of it can be seen except a crescentic line where the new growth meets the anterior wall. He cannot hear the watch even when pressed against the auricle. The progress of the disease has not been attended with pain, and the gentleman is in perfect bodily health. Upon the left side he can hear the watch when pressed against the auricle, there being, fortunately for the patient, two exostoses, which, meeting by their convex surfaces, have prevented complete closure of the inferior portion of the meatus, and as there are still manifestations of inflammatory action going forward in the meatus, treatment holds out a hope of improvement. (See page 209.)

Schmalz has figured a small exostosis from the work of Platernus, which grew within the vestibule; and several instances have been recorded of exostoses within the cavity of the tympanum.

When otorrhœa has been long established, or that caries has taken place, *fistulous openings* form between the external meatus and the mastoid or aural regions. In the former situation they are not at all uncommon; I have, in two instances, seen sinuses five inches in length, extending from the external auditory canal along the side of the neck, and not long since there was a patient at the Hospital labouring under phthisis and otorrhœa, who could pump the matter out of his ear by pressing upon an abscess situated over the upper edge of the scapula.

Polypi in the external meatus are very common, and generally grow from some part of the bony portion of the canal. As they are always attended with otorrhœa, they shall be considered in the chapter devoted to that subject. The consideration of *caries* also belongs to the chapter upon otorrhœa.

MALIGNANT DISEASES OF THE MEATUS.

Malignant diseases in the external meatus are very rare, although they may engage that part in some stage of their progress. Of lupoid ulcerations, and cutaneous cancer, I have already spoken at page 172. Osteosarcoma of the lower jaw or the malar bone sometimes encroaches upon the meatus, as may be seen in the morbid specimens in our museums. The following case is worthy the attention of the surgeon, as it shows us how careful we should be in meddling with morbid growths of long standing, without being fully satisfied as to their nature and the place from which they grow.

A female, aged about 50, whose brother I subsequently heard had died of cancer, consulted me some years ago on account of a polypous growth in the right ear, attended with a remarkably fœtid discharge of many years' duration. She had an unhealthy look, and complained occasionally of giddiness, loss of rest, and sickness of stomach. The otorrhœa having increased considerably of late, she was anxious to have it removed if possible. The meatus was filled with a large reddish-brown flabby polypus, much darker

in colour than I had ever seen before. On examination I found it firmly attached to the lower and posterior wall of the external meatus, and I could not lift it up or pass a probe round it, as can generally be effected in ordinary cases of polypus, no matter of how long standing. Neither did it present the circular protuberance which forms in cases of fibrous polypus as soon as the morbid growth has cleared the meatus and commenced to mould itself into the shape of the external aperture. It was not possible to examine the canal, so completely did the morbid growth fill it up, but a probe could be passed with facility all round its upper and anterior surface. These were the only symptoms which presented when I first saw her. She stated that she had latterly suffered from pain in the ear, and that upon several occasions during the past year pieces of the polypus had come away. Finding it impossible to pass a snare round it, I removed a portion of it with a scissors, and the hæmorrhage which followed was inconsiderable. Subsequently I attempted to lessen the growth by the application of nitrate of silver applied to its surface, and also by passing a small sharp-pointed probe, coated with the caustic, through its surface. Constitutional treatment calculated to improve the patient's health was not neglected; and for a short time, the local appearances improved, but I was never able to clear the meatus of the morbid growth. My attention was soon attracted by the rapid progress of the fungoid mass, which increased almost as quickly as it was removed. In the course of a month the serious nature of the disease manifested itself. The growth from the meatus assumed a livid unhealthy colour. The auricle was pressed forward and outward by a fluctuating tumour over the mastoid process. This I opened, and a quantity of dark-coloured fœtid matter was evacuated, and considerable relief experienced for a short time. Paralysis of that side of the face next appeared; several large abscesses formed along the course of the mastoid muscle; well-marked rigors ensued, and the general health gave way, the characters of malignant disease being strongly marked in the countenance. Convulsions, followed by long fits of coma, ensued, and the pain at times was most excruciating. The post-aural and infra-aural regions rapidly enlarged; the integuments of the mastoid region gave way, and a large

fungoid mass sprouted therefrom, which, in a few days, attained the size of a lemon. The fœtor was the most intolerable and sickening I ever smelled, and death put an end to her sufferings in about three weeks after the external appearance of the fungus, which presented all the characters of true malignant disease. I was unable to obtain a post-mortem examination.

Whether benign disease can, by interference, be converted into malignant, has not yet been decided by pathologists. Where the disease originated in this case, it is not possible to determine; eventually, however, it must have engaged all the cavities and structures of the ear. The only point in which this case differed from one of ordinary polypus, resulting from chronic inflammation and otorrhœa, when I first saw it, was in the attachment of the growth to the external and posterior lip of the meatus.

The following case, for the particulars of which I am indebted to Mr. Cusack, occurred in this city in 1843. It was originally published in my essay on otorrhœa, but is so similar in many respects to the foregoing that I insert it here.

An apparently healthy boy, seven years of age, was brought to him on account of a discharge from the external meatus. Upon examination, a small polypus was discovered in the passage; this was removed, but on the third day following it was found to have grown as large as ever; it was again repeatedly removed, and the usual slightly astringent washes were had recourse to in the interim. This polypus or fungous growth did not present anything remarkable except the extraordinary power of being reproduced in a day or two, on which account it was no longer attempted to be destroyed, but a more palliative mode of treatment was had recourse to. Not long after, the child was suddenly seized with an epileptic fit; and then, on closely examining the ear, a fluctuating point was discovered over the mastoid process; this was instantly cut down upon, and the opening gave exit to a large discharge of pus. It was then found that the cavity which contained this matter communicated by a fistulous opening with the external auditory tube; — a fungous mass almost immediately sprouted through the incision; the parts in front and all round the ear became swollen, and had that peculiar *boggy* feel to the touch,

which left but little doubt regarding the malignant nature of the disease. The original aural polypus remained as before, but, from the struggles of the child and the condition of the parts, at no one period was it possible to learn with accuracy the state of the tympanum. Repeated attacks of epilepsy, each increasing in violence, and the intervals shortening in duration, followed quick upon this deplorable condition, and death soon closed the scene.

Upon examination it was discovered to be a well-marked case of osteosarcoma of the petrous and mastoid portions of the temporal bone. The petrous portion in particular was enormously enlarged, and so softened as to be capable of being cut with a knife. The whole presented a large fungous mass, which, however, did not engage that portion of the brain which lay upon it. All traces of the internal ear had been obliterated. There can, I think, be little doubt, but that in this case the original disease was seated in the bone, and that the aural discharge and fungus were but secondary morbid appearances.

Dr. Hutton has just informed me that he had lately under his care a case of chimney-sweepers' cancer of the external ear.

A fortnight after the note of Dr. Morgan's case of exostosis, referred to at page 205, I saw Mr. B., whose treatment had, in the interim, consisted in leeching the meatus, and the internal administration of minute doses of the bichloride of mercury. The improvement was truly astonishing: the protuberances in the left ear had lessened considerably, and the hearing was nearly restored on that side.

We sometimes meet with small, white, round bodies, the size of millet seeds, in the walls of the meatus, similar to those frequently seen about the eyelids.

In describing the diseases of the auricle, I should have mentioned "dislocation," of which a remarkable example presented at South Carolina, in which the auricle was detached from its seat, and carried downwards on the surface of an enormous pendulous tumour. (See London Medical Repository, 1816.)

CHAPTER V.

DISEASES OF THE MEMBRANA TYMPANI.

Anatomy of Membrana Tympani.—Its Congenital Malformations.—Injuries of: Rupture.—Inflammations: Acute; Rheumatic Otitis.—Subacute: Syphilitic; Gouty.—Senile Deafness.—Strumous; with Ophthalmia.—Exanthematous; Typhoid.—Chronic Thickening and Morbid Deposits in Membrane.—Cutaneous Diseases.—Collapse, with Loss of Vibration.—Operation of Perforation.—Ulceration; Apertures in Membrane; Total Destruction of.—Artificial Membrana Tympani.

THE *membrana tympani*, or drum-head, separates the external meatus, at the extremity of which it is placed, from the cavity of the tympanum; so that, from its position as well as the anatomical connexion of its structures, it must partake of the diseases of both cavities independent of those peculiar to itself. It is a thin, semitransparent, dry membrane, of an irregular oval shape, varying in size as much as the cornea, but generally measuring about eight-twentieths of an inch in its longest diameter, which is in a diagonal line from above forwards and downwards. It is placed obliquely from above downwards, and somewhat from before backwards and outwards, and set in a well-marked groove upon an elevated ridge, at the tympanal margin of the bony meatus, like the crystal on the besil of a watch. In fœtal life this tympanic ring is a separate and distinct portion of the temporal bone, and does not become altogether incorporated with it until some time after birth. It is produced from a separate and distinct point of ossification, and may, therefore, be regarded as a fourth division of the temporal bone superadded to those already enumerated at page 150. From this ring grows the osseus meatus auditorius externally, and also a portion of the floor of the cavity of the tympanum internally. This circle is never completed, as may be seen by examining a section of the temporal bone, made through the tympanum, immediately behind the groove for the attachment of the membrane. It remains deficient superiorly, where the malleus joins the membrana tympani, and

at which point the head of that bone lies in the superior sinus of the tympanum. If we examine a number of temporal bones, we will find the groove for the membrane deepest at the lower and back part, and least marked above, towards the part where the ring is generally deficient.

The manubrium, or handle of the malleus, is enclosed for about three-fourths of its length between the laminæ of the membrana tympani, which are partially inserted into it. This process of the hammer-bone serves to support and also to preserve the peculiar curvature of the membrane, as well as to convey to the labyrinth the vibrations of sound which impinge upon it. At birth the tympanic ring, with its enclosed membrane, looks obliquely downwards and slightly outwards, and it is only by the formation of the floor of the tympanum that the position which it assumes in adult life is produced. The membrana tympani is also proportionally larger in the fœtus than in the adult. A knowledge of these relations is important in a pathological point of view, as they show how easily disease of the meatus or the membrana tympani may be propagated to the neighbouring parts.

Viewed through the speculum, with a stream of clear, direct sunlight upon it, the membrana tympani is of a greyish hue, and semitransparent consistence ; and presents externally an irregularly curved surface, as also different degrees of density, polish, and tension. It is divided by a white streak, thick above and narrow below, except at its extremity, which is slightly enlarged and indented into a navel-like depression. This white opaque line is the manubrium of the malleus, proceeding from the upper attachment of the membrane downwards, somewhat backwards and a little inwards to a point slightly below the centre of the membrane, and thus divides it into an anterior, a posterior, and an inferior portion. But the exact situation of this bone, and consequently the relative proportions of the parts which it divides, present great diversity. The anterior part of the membrane is thin,—almost transparent, or as clear as fine gold-beater's skin,—highly polished, and generally *convex*—a speck of bright light being reflected from its most prominent part. This may be called the anterior vibrat-

ing portion. In many cases the short process of the malleus may be seen as a small round dot above the manubrium where the membrane curves off into the roof of the meatus. The bottom of the meatus, it should be remembered, is funnel-shaped, the broad end of the funnel being towards the tympanum.

When the centre of the membrane is under examination, its anterior attachment, behind the sharp curve of the meatus, cannot at the same time be seen, nor until the tubular speculum is turned towards it, and the head of the person examined is brought into the proper angle; and the same remark holds good, except in cases of very large meatus, with respect to the posterior margin; the superior and inferior attachments are more easily observed; but, by rotating the speculum, and altering the head from side to side, we can bring in succession each portion of the membrane into view. The relative size of each portion of the membrane varies in different individuals. In making this examination the tube should not be inserted much beyond the middle of the meatus. Below and behind the malleus the membrane is also thin, clear, and glistening, but not quite so diaphanous. Beneath the point of the malleus it is *flat*, and behind it rather *concave*, but not always so. These portions do not usually present in their normal state spots of reflected light. Superiorly, from about the upper half of the malleus, the membrane becomes gradually denser until it is quite white; it also forms concave curves from the upper part of the malleus, the posterior one being deepest and whitest. Above, the membrane forms a gradually vaulted curve into the roof of the external auditory canal, with the lining of which it is imperceptibly blended; while in front, below and partly behind, there is a sharp, well-defined line of demarcation between it and the meatus, and sometimes a slight, whitish thickening, which in disease and in some old persons resembles the arcus senilis, except that in the cornea there is always a narrow clear space between the opacity and the sclerotic. In some persons there is a slight purse-like projection of the membrane near its upper attachment and behind the tubercle of the malleus —the "membrana flaccida" of Sharpnell—rudimentary in man,

but well developed in some of the lower animals. The speck of light which is generally reflected from the most convex and prominent portion of the membrane is not always in the centre of the anterior part, but is often seen beneath it. If a horizontal section of the membrana tympani be made, it will present somewhat the form of an italic (*f*), the middle point being the circular flattened extremity of the manubrium of the malleus.

If the patient under examination inflates the tympanum after the manner described at page 64, without moving the head, altering the position of the speculum, or in any way deranging the light, the whole of the anterior and part of the lower portion of the membrana tympani is bulged outwards, and the speck of light appears as if spread over a larger surface, or is entirely lost for the moment. Whether the membrane is then rendered more or less tense I cannot satisfactorily state. In some cases a slight elevation or outward pressure of the malleus, and even of the whole membrane, may be observed. If the inflation be continued, the upper white portion frequently becomes red, and vessels can be seen at times spreading from it along the sides of the malleus.

Great diversity of opinion exists among authors with respect to the curvature and general appearance of the healthy membrana tympani. They almost all, however, agree in pronouncing it a uniform concavity; but this I believe to be a post-mortem appearance. One of the proofs afforded by anatomists of the external concavity of membrana tympani is,—that, when the cuticular lining common to it and the meatus is removed entire, and floated in water, its extremity forms a curved pouch like the finger of a glove. This, however, is a very fallacious test; for, if we take the finger of a glove and invert its extremity, so as to present a marked convexity towards its internal surface, we can easily, either by blowing into it or drawing it through water, make it assume a concave appearance.

Well acquainted as every person familiar with the character which the membrana tympani presents upon inflation, it will appear almost incredible that Dr. Kramer should believe that even a forcible stream of air from the air-press cannot alter its concave form.

It is of great importance that we should be not only acquainted but familiar with, the external appearance of the membrana tympani in a normal condition; yet how many practitioners pass through life without ever having seen it in the living state!—all they know of it being from description or preparations shown them during their anatomical studies.*

Behind the attachment of the membrane superiorly, there is the head of the malleus, which rises above it into a large hollow in the bone, which freely communicates with the mastoid cells. Anteriorly, and somewhat below the middle line, there is the tympanic opening of the Eustachian tube, opposite the portion of membrane most easily acted upon by a stream of air, and that where it most usually gives way. Below and behind the Eustachian tube is the carotid canal, usually perforated in that part of its posterior curve nearest to the membrana tympani by a small aperture for the transit of a vessel which, being distributed to the membrana tympani from so near and large a stream, may, with its other plentiful supply, account for the pulsation which that membrane presents in certain forms of disease. Behind, and winding round its posterior and upper margin, the aqueduct of Fallopius conducts the portio dura to the stylo-mastoid foramen; and the proximity of that nerve to the cavitas tympani and its external partition, will enable us to account for the facial paralysis which frequently accompanies disease of the ear.

The structure of the membrana tympani has been carefully investigated by many eminent anatomists, and is found to consist of a proper fibrous layer, and two others borrowed from the neighbouring structures,—viz., the epidermis continuous with that reflected over the meatus externally, and the fine, delicate, mucous lining of the tympanal cavity—a portion of the great gastro-pulmonary investiture prolonged through the Eustachian tube—internally. The tegumentary or external cuticular layer is, in a healthy condition, remarkably fine, and so transparent that the fibres of the layer beneath it can be seen distinctly through it; yet, in dis-

* In addition to the foregoing observations, see the remarks upon the membrana tympani, at pp. 106–7. See also the author's description of this structure in the Dublin Quarterly Journal of Medical Science, vol. xxiv. p. 421. 1844.

ease or by decomposition, it is rendered white and thick, and can frequently be detached in an unbroken scale. Within, the mucous lining is so fine that it is discerned with difficulty, yet in disease it becomes thickened, vascular, villous, and even pulpy.

The middle or proper fibrous layer is composed of two laminæ,—a radiate externally, a circular internally; in addition to which there is a cartilaginous or ligamentous ring, already referred to at page 213, which is somewhat denser and whiter than the rest of the membrane, and surrounds its attachment, except at the upper portion where the osseous groove, into which it is inserted, is deficient. This cartilaginous circle is continuous with, and intimately united with the periosteum, and the radiating fibres of the external layer are inserted into it. In the living, healthy ear, it can often be distinguished from the rest of the membrane, but in disease it becomes very manifest, and frequently presents a bright vascular zone, when the rest of the membrane is unaffected. It is also the seat of that inferior crescentic opacity described in the analysis of the Registry, at page 136. The fibres of the external radiating lamina proceed from the sides and the extremity of the malleus to the cartilaginous ring for about the inferior half of the membrane. Superiorly the fibres pass across or are external to the upper portion of the malleus, and are inserted into the periosteum of the meatus. The circular lamina passes, for the most part, behind the handle of the malleus, and is united by fine cellular tissue to the radiating layer in front of it. It is unconnected with the cartilaginous ring, but is said to be continuous with the periosteal lining of the tympanal cavity.*

* Mr. Toynbee, the latest authority upon the subject, has, in an Appendix to his paper "On the Membrana Tympani of the Human Ear," in the Philosophical Transactions for 1851, described the membrana tympani as composed of six laminæ,—viz., the epidermoid, or cuticular; the dermoid, a distinct and complete lamina of membrane which is continuous with the dermoid layer of the meatus, and which, from its containing numerous blood-vessels, might be called the vascular layer; the external radiating lamina of the fibrous layer, continuous with the periosteum of the meatus; the internal circular, continuous with that of the tympanum; the mucous lining; and finally the epithelium covering that structure, in addition to the circular fibro-cartilaginous portion already described. But these are too minute subdivisions for practical purposes.

Sir Everard Home and others maintained that the membrana tympani was muscular, but subsequent observers have not confirmed that idea; and Professor Harrison, in his dissection of the ear of an elephant, that died some years ago in the Zoological Gardens, is of opinion that the membrane is not muscular. Rivinus, and some of the older anatomists, conceived that a natural aperture existed in the membrana tympani, but this error has been corrected by modern investigation. That many persons have, however, a perforate membrana tympani without experiencing any inconvenience from it, is well known; such persons are generally able to force tobacco smoke through the external meatus. The thinnest portions of the membrane are about midway between the points of the malleus downwards and forwards in the anterior portion, and downwards and backwards in the posterior portion. It is, therefore, in one or other of these spots that we generally find it perforated by either accident or disease.

The membrana tympani is, in a state of health, highly sensitive, the slightest touch producing the most acute pain. Mr. Wharton Jones says it receives "a nerve from the third division of the fifth, which has communications with filaments from the chorda tympani."

Thin, dry, and almost transparent as the membrana tympani appears in the healthy living state, it can, by fine injection, be rendered a complete vascular net-work, and the same appearance may be perceived in disease, modified according to the peculiar structure or special vessels engaged. Arnold, in his magnificent lithographic plates, has given figures of the veins and arteries of the membrana tympani, from the latter of which I have had the accompanying accurate wood-engraving copied.* Soemmerring has also faithfully represented the arteries of the tympanal membrane in the normal condition as two long vessels proceeding from above downwards and backwards



* Tabulæ Anatomicæ; Fasciculus Secundus; Tab. v., fig. 23. The Drawing, reduced about one-third, has been copied and engraved with great fidelity by Mr. Oldham.

along the course of the handle of the hammer, and branching on either side into the anterior and posterior vibrating thin portions of the membrane. The outer circle in the woodcut is the bony ring upon the right side seen from within in an infant, and the central body is the cut off extremity of the manubrium. The large artery proceeding from above downwards is the tympanic branch of the stylo-mastoid, which anastomoses freely and by large trunks at the upper deficiency of the ring, with vessels received from the internal maxillary through the Glasserian fissure. These vessels, uniting, send a considerable trunk along the attachment of the manubrium; but in the living state, when the membrane is irritated, two or three vessels can generally be seen coursing downwards on each side of the bone, and looping round its extremity. This tympanic artery then radiates, as shown in the cut, towards the periphery of the membrane, where it inosculates so freely as to form a circumferential vascular plexus with the tympanic branch of the deep auricular which is given off at the angle between the temporal and internal maxillary. This latter vessel reaches the membrane at its lower curvature, and forms that crescentic red appearance frequently seen in partial inflammation of the lower portion of the membrana tympani. Both these vessels ramify on the external surface of the proper fibrous layer, and being continuous with the vascular supply of the external meatus and the auricle, show how much more effectual local depletion made round the aperture of the auditory canal must be in relieving turgescence of the vessels of the membrana tympani than when applied on the mastoid process, as formerly in use. Towards the upper portion, in particular, we can frequently trace those vessels which ramify about the malleus into the vaulted roof of the meatus.

That the mucous lining of the tympanic cavity, reflected over the back of the membrana tympani, though so thin and transparent in health as to be demonstrated with difficulty, becomes in disease suddenly and intensely vascular, I have had many opportunities of determining. In such cases, the proper fibrous layer, as well as the cuticular envelope of the membrana tympani remain polished and as transparent as natural, while the inflamed

mucous lining may be seen through these structures of a pinkish colour, somewhat like that observed on the under surface of a monthly rose-leaf. The arterial supply of this lamina is obtained from a variety of sources, viz., the stylo-mastoid, the temporal, the internal maxillary, the meningeal, and the internal carotid arteries; the latter sends its twig through the small hole in its bony canal, referred to at page 214. When the proper fibrous membrane is inflamed, it will sometimes present one uniform sheet of bright red; in addition to which I have frequently seen and pointed out to my pupils several small straight vessels superficial to the general redness, and radiating from the centre towards the circumference.*

During life these vascular arrangements can only be seen in disease, and with a stream of clear bright sunlight directed upon the membrana tympani. Having brought the membrane fairly within the field of the speculum, a magnifying glass held in the proper position will not only, by enlarging the parts under inspection, but also by concentrating the light upon them, materially assist our view. I lately showed, that when the membrana tympani has been perforated, the globule of air, or mucous bubble, entangled in the aperture pulsates synchronously with the heart and arteries.† That this motion is imparted to the membrane by the copious vascular supply from so many large adjacent sources, I have had within the last few days an opportunity of determining; for, having placed a piece of cotton moistened with oil within the remnant of the membrana tympani, which, except at the upper portion, scarcely advanced within the tympanic groove of the meatus, I was astonished to find that it pulsated in like manner with the membrane, receiving, I presume, the impulse from the arterial circle still remaining in connexion with the groove to which that structure had been originally attached.

* In cases of long-continued inflammation of the iris, large red vessels can be seen ramifying on its surface; but, in acute cases, I have lately been able to determine, with the aid of a strong magnifying glass, that the rusty or brownish-red unelevated spots seen on the corneal aspect of that membrane prove to be nothing more than congeries of vessels carrying red blood.

† See a case of Otorrhœa with perforation, and description of a new diagnostic symptom, in the Medical Times and Gazette for 27th March, 1852, No. 91.

The membrana tympani is in health the dryest membrane in the body,—is it hygrometric, or capable of imbibing moisture from the surrounding atmosphere, and thus becoming more or less tense, according to the medium in which it is placed? I believe it is, although it is difficult to offer proof thereof. Certainly patients labouring under partial deafness affirm, that on dull moist days, or in damp weather, they cannot hear so well as when the atmosphere is dry and clear. How much of this depends upon the atmosphere considered as a medium for conducting sound, or upon the condition of the membrana tympani itself, we have yet to learn. There are other subjects connected with the state of tension, amount of curvature, and degree of flattening or collapse which the membrane occasionally presents, that might be considered here, but that they properly belong to the pathology of this part.

I have dwelt thus long upon the anatomical characters of the membrana tympani because it is that part of the ear least known to students or practitioners; and because in it will, according to my observations, be found characteristics of disease and pathological changes from the normal structure, sufficient to account for at least two-thirds of the cases of impaired hearing, independent of mechanical impediments from wax, and the inflammations presenting otorrhœa which occur in practice. It is true that the pathological condition or amount of disease seen upon the external surface of the membrana tympani is frequently insufficient to account for the degree of deafness; still such changes, which are visible to the eye, are indicative of certain conditions of the middle ear which are beyond our ken,—in the same manner as the state of the cornea and iris, which we do see, are characteristic of certain changes in the parts beyond (the choroid and retina) which have proved destructive to vision, which we do not see; and the amount of mechanical defect is seldom commensurate with the extent of mischief in the sensient parts beyond.

MALFORMATIONS OF THE MEMBRANA TYMPANI.

Where the external auditory canal or the tympanum is deficient, or closed by bone, the membrana tympani must, as a matter of

course, be wanting. Cases have been recorded in which a false membrane covered the membrana tympani. The only instance I have seen of irregularity in the membrana tympani consisted in malposition of the attachment of the malleus. Upon examining the ears of the pupils in the Institution for the Deaf and Dumb at Claremont, I observed two instances in which the manubrium, instead of occupying its usual position, passed forwards towards the lower and anterior attachment of the membrane. In a third, the membrana tympani was one uniform, concave membrane, without the slightest vestige of any of the ossicles within it, and I have seen a similar case in private. It is believed that the hole which Rivinus considered as a normal formation was, in the instances which he examined, an accidental malformation.

WOUNDS AND INJURIES OF THE MEMBRANA TYMPANI.

Injuries of the membrana tympani, independent of those arising from inflammation or its consequences, may be caused by penetrating instruments or foreign bodies passing through from the external meatus; rupture in whole or in part by external violence, such as fracture of the temporal bone, blows on the side of the head, or falls, &c.; and loud sounds, concussions, or the sudden impression of a stream of air from within the tympanum, when the membrane is in a particular state of tension, and, perhaps, I should add, of dryness. I have already given instances of foreign bodies passing through the membrana tympani; and many cases have been recorded of the membrane having been perforated by the accidental introduction of penetrating instruments, or even pins and ear-pickers. Sir Astley Cooper relates a case of laceration of the membrana tympani caused by a box on the side of the head, extending from above downwards across the entire membrane. When bleeding from the ears occurs in hooping cough, sudden violent congestion, or strangulation, I suppose the hæmorrhage comes from the middle ear through the burst membrana tympani.

Case No. 58 in the Registry is that of a man aged 40, who, in a fit of intoxication, fell against the street railing, and was carried home insensible. He had considerable hæmorrhage from the left ear both at the time and for several hours after. Having lost

the hearing completely on that side, he applied at the hospital one month subsequent to the accident. The membrana tympani was rather opaque, and a well-marked cicatrix running from above downwards, anterior to the malleus, could be observed; it was of a dense white colour, but became red upon the tympanum being inflated. A second case, that of a female aged 30, No. 122 in Registry, presented somewhat the same appearance from a blow on the right ear, followed by hæmorrhage, but the accident had occurred three years before I saw her. The subject of hæmorrhage from the ear not having been yet sufficiently investigated in a pathological or a medico-legal point of view, a wide field for inquiry into this subject still exists. Bleeding from the ear has been remarked in persons ascending to great elevations, as well as in descending in diving-bells; and professional divers, likewise, experience the same affection. Diving to any depth is a frequent cause of rupture of the membrana tympani; I have seen two instances in which it occurred. A gentleman, when in a warm bath, having allowed some of the water to get into his external meatus, thrust in his finger forcibly, with the intention of dislodging it, when he felt something burst in his ear, and he immediately perceived the water in his throat. I saw him a short time after, when the parts were considerably inflamed. There was a small rupture in the inferior portion of the membrane. The gentleman was for a long time after the accident in the habit of applying a drop of fluid with the point of his finger into the meatus, and letting it fall into the aperture in the membrana tympani,—a practice which many persons, with perforations in the lower portion of the membrana, are familiar with. A lady, whose ears I had examined a few days previously, and in whom the membrana tympani was remarkably thin and dry, sent for me to say that, while blowing her nose violently, something had suddenly burst in her ear. Upon inspection, an hour after the accident, I found an aperture in the anterior vibrating portion of the membrane of a triangular shape, with lacerated, everted edges; a slight streak of blood surrounded the rent; there could be no doubt as to the cause of the rupture.

Any loud, sharp report, such as that from a piece of artillery, may cause temporary, or even permanent, deafness, rupture of

the membrana tympani, and hæmorrhage from the meatus. Artillery recruits frequently suffer from bleeding from the ears, but the exact cause has not been yet fully ascertained.

Surgeon Thornton of the Royal Artillery, to whom I addressed a letter on the subject of hæmorrhage, tinnitus, and deafness in gunners, writes to me as follows:—"Many of the men state that they have seen hæmorrhage occur, but it is not so frequent as is supposed; dulness of hearing is, however, very common, especially among old gunners. The effect of position, with reference to the gun, is peculiar,—those men who stand nearest the muzzle feel the report most, but all who are to leeward suffer more than those to windward. Brass ordnance ring louder and make a sharper report than iron guns,—the usual effect of which, as I have myself experienced, is that of receiving a smart blow upon the tympanum; this, however, soon passes off, and leaves a singing or tingling sensation in the ear for two or three days. Another peculiar sensation is that of having water in the ear, as if after bathing. After some practice the ear becomes accustomed to the shock, and men learn by experience where to stand so as to feel the concussion least."

In one of the artillery now quartered in Dublin, who suffered from hæmorrhage from the ears the first time he was at field practice, fifteen years ago, and whose ears I examined this day, I found a small, white, well-defined line or cicatrix proceeding from above downwards behind the manubrium of the malleus, than which it is a little shorter. Both ears presented precisely the same condition, and the hæmorrhage, he says, was equal upon each side. The rest of the membrane is normal; he is not deaf.

A medical practitioner at Portsmouth has kindly afforded me the following note of his own case:—"I was standing about half a dozen yards from a large cannon when it was fired for a salute. At the instant the gun was fired I felt a very severe shock, but unattended with pain, in my right ear, which was that nearest the cannon. I immediately perceived that I had lost all power over the right side of my face. In fact, I had suddenly become affected with 'Bell's paralysis.' At the end of ten days, finding I did not recover, I applied a blister to the back of my neck, lived sparingly,

and took a sufficient quantity of calomel to affect my gums slightly. Not deriving the benefit I anticipated, I went to London and consulted Sir B. Brodie, who recommended me to discontinue all treatment and to live generously; when I soon got quite well."

I was consulted by Captain H. some years ago, on account of total deafness of the right ear, attended with an incessant buzzing noise. He stated that he lost his hearing instantaneously while grouse-shooting. His gun had been overcharged, and "kicked" so violently as to cause him to stagger; he felt a sharp pain in his ear, and became conscious of his loss of hearing immediately. The membrana tympani was very much collapsed.

I believe that the best treatment which can be adopted for recent injuries of the membrana tympani is to let them alone, unless inflammation should arise, when it must be met by local depletion, &c. It is remarkable that, while we experience the greatest difficulty in keeping open a perforation made with a surgical instrument, accidental openings seldom close.

INFLAMMATIONS OF THE MEMBRANA TYMPANI.

Myringitis, or inflammation of the membrana tympani, has not been recognised or described by authors until within the last few years: and its varieties, with their peculiar symptoms, are by no means accurately understood. Itard, one of the earliest and most esteemed writers upon aural surgery, has not mentioned it, though the symptoms of at least one form of the disease are enumerated by him under the head of internal otitis. The old divisions of inflammations of the ear into otitis externa and interna do not in any way assist either our diagnosis or improve our treatment, and the same may be said of the divisions into acute and chronic. The otorrhœa which follows in such cases, and which formed, with many writers, grounds for nosological arrangement, being but a symptom, like that of leucorrhœa in the female, is an insufficient ground of diagnosis.

Lincke, as already shown at page 144, classes the aural inflammations according to their causes, as the erysipelatous, scrofulous, syphilitic, &c.; but the exact locality or seat of the original inflammation, or the peculiar appearance of such, are not specified.

These are merely enumerations of diseased actions, generally characterized by muco-purulent discharge, attendant on, or following these different affections. He was, however, one of the first accurate describers of the "*Entzündung des Trommelfells,*" the true Myringitis.*

Kramer, in his first work, gave a section on acute inflammation of the membrana tympani, but upon a careful perusal of it we find about four pages devoted to the description of that disease, while the remainder is occupied with the consideration of polypus, and a detail of the various methods recommended for performing perforation.

Mr. Pilcher disposes of inflammation of the membrana tympani in a few pages, but enumerates most of the symptoms of the affection (except the minute appearances of the membrane), under the head of otitis interna. Mr. T. W. Jones has given a short description of one form of the disease. I cannot, however, agree with him, that in "otitis interna morbid changes in the membrana tympani occur only when it is threatened with bursting by the matter accumulated in the cavity of the tympanum, and has also become involved in the inflammatory action." On the contrary, my experience leads me to believe that inflammation of the middle ear always, and at the very commencement, is shown by the appearance of the membrana tympani; and this observation must remain undisputed until a sufficient number of accurate examinations shall have been made, in the commencement of cases of otitis interna, to negative it. It is quite plain from Dr. Williams's account of the "inflammation and ulceration of this membrane," that he never *examined* the membrane in this condition; indeed, I doubt if he ever *saw* the disease under consideration.

Dr. Martell Frank has given a concise but faithful description of both the acute and chronic form of the disease. M. Hubert-Valleroux does not even enumerate the inflammation of the membrana tympani in his catalogue of aural diseases; and Schmalz has done little more than glance at the disease. He has

* From *myringa—myrinx*,—the membrane of the drum.

evidently mixed up the description of its symptoms with those of other inflammatory affections of the ear.

In the following cases and description, the inflammations of the membrana tympani have, in many instances, been connected with those of the middle ear, because I do not believe it possible for one to exist independent of the other for any length of time: no more than an ophthalmia can be circumscribed, or than we can by the term iritis define a simple uncomplicated inflammation of the membranous diaphragm of the ocular chamber.

By the term *myringitis* the reader is to understand inflammation of the membrana tympani; and by *tympanitis*, inflammation of the cavity of the tympanum.

Abscess in the membrana tympani must be a very rare disease. In the year 1843 I had opportunities of seeing two cases of a circumscribed deposit of pus between the layers of the membrane; each was about the size of No. 6 shot; and in one instance, when I punctured the abscess with a cataract needle, a small drop of pus oozed out.

I have, in the nosological chart at page 148, enumerated the various inflammations to which the membrana tympani is liable, but for all practical purposes the following forms, with which I am myself familiar, will suffice:—

1. Acute inflammation of the membrana tympani, commencing in the fibrous layer, accompanied by inflammation of the cavity of the tympanum; frequently of a rheumatic character.*
2. Sub-acute inflammation, unaccompanied by pain.
3. Syphilitic inflammation.
4. Strumous inflammation, generally in the mucous layer, with mucous engorgement of the tympanum.

* This enumeration, but somewhat differently arranged, is that which I adopted in my Essay upon "Inflammatory Affections of the Membrana Tympani and Middle Ear," published in 1848, and I have not since seen reason to alter it or render it more minute. In Mr. Harvey's book upon "Rheumatism, Gout, and Neuralgia," &c., of the Ear, he states, in the opening paragraph, that, "Rheumatism affecting the structures of the ear has not hitherto, as far as my researches have enabled me to ascertain the fact, been noticed in *any* medical work." Now, both Lincke and Frank have given descriptions of gouty and rheumatic otitis; and Mr. Harvey has quoted at length a well-marked instance of "severe rheumatic inflammation of the membrane and cavity of the tympanum," from my Essay already alluded to.

5. Chronic inflammation, with or without inflammation of the cavity of the tympanum.

6. Febrile inflammations, accompanying the exanthematic and other fevers, extending from the tympanum, and generally producing otorrhœa.

ACUTE MYRINGITIS.

In *acute inflammation of the membrana tympani*, the vascularity is generally seated in the true fibrous structure, and is usually the result of cold, and often attributed to rheumatic diathesis, sudden exposure to a low temperature, blasts of harsh cold wind, diving in the sea, foreign bodies, and irritating substances introduced into the external ear, &c. The auditory canal, and sometimes even the auricle, is engaged; and although we are not able to observe the precise pathological condition of the cavity of the middle ear, or its investing membrane, there can be little doubt but these parts, sooner or later, participate in the general inflammatory action. As, however, we denominate that form of internal ophthalmia which chiefly or primarily attacks the iris, an iritis, although, in the severer kinds of that affection, several if not all, the other textures of the eye eventually become engaged, so in inflammations of the membrana tympani, to which the term myringitis is applicable, we must expect that sooner or later the adjoining structures,—the mucous membrane lining the tympanum, with its numerous nerves, the nerves which cross this cavity, the periosteum, the mastoid cells, the investitures of the Eustachian tube, the membrane of the fenestra cochleæ, the muscles, ligaments, and other connexions of the ossicula, the labyrinth, the internal ear, and the auditory nerve itself,—will sooner or later participate in the unhealthy action going forward; and which must, either directly by the inflammatory lesion, or its subsequent effects, serve to impair hearing, and cause organic changes in this delicate organ. But in addition to the alterations analogous to those which occur in ophthalmic inflammations, we may have, from the peculiar anatomical structure of the ear, an extension of disease to parts which not only destroy the sense of hearing, but prove dangerous to life, as when the bone, the membranes of the brain, or the encephalon itself, become engaged.

The dermal structure partakes of the abnormal action, and, together with that of the auditory canal, pours out a muco-purulent secretion, or even pus itself,—is occasionally raised into vesicles, becomes the seat of pustules, ulcerates, throws out granulations, and becomes thickened, &c., during the progress of disease. The true fibrous membrane passes through all the pathological changes to which such structures are liable from inflammatory action or its results; and although the precise anatomical condition of the two may not be analogous, yet the diseases of the cornea and of the membrana tympani bear a remarkable analogy, particularly in the subsequent appearances of vascularity, thickening, opacity, and morbid deposits, &c., which they present, together with adhesions by bands of membrane to the parts within the chambers, to which they form the external boundaries.

The following are generally the order of symptoms. A seizure of sudden and intense pain in the ear itself, most generally first appearing at night, and attended with nocturnal exacerbations during the progress of the disease. This pain is of a most excruciating kind, producing at times delirium, and is usually likened to that of a sharp instrument penetrating through the ear to the brain: it is, especially when the cavity of the tympanum is engaged, increased by coughing, sneezing, blowing the nose, chewing, or swallowing, or by pressing upon the tragus, particularly when the jaw is open. The beating of the carotid is distinctly felt in the ear, and each throb of the artery, especially if the circulation be excited, increases the suffering; and there is frequently a feeling of fulness and bursting within the organ. With this there is also pain and soreness over the side of the head, in the teeth, in the eye and temple, and in the superior lateral triangle of the neck; with occasionally stiffness and soreness of the upper portion of the mastoid muscle, and often flying rheumatic pains throughout the body, particularly in middle-aged persons, and those who have previously suffered from rheumatic attacks. If neglected, or unrelieved by treatment, the pain extends to the throat and mastoid region, and is increased on pressing the mouth of the Eustachian tube with the finger. The severity of the pain experienced, and the extent of soreness to the touch, is to a cer-

tain degree a test of the amount of the inflammation; and the peculiarity of the pain is also a means of judging of the seat of the inflammation; for if it is experienced in swallowing, mastication, or sneezing, &c., we may presume that the inflammation has extended over the middle ear.

I have known a man to be treated for inflammation of the brain who merely laboured under inflammation of the ear; and on the other hand a very curious impression exists among, and is too frequently acted on by, the profession, that ear-ache is a *neuralgic* affection. To this very general mistake must we attribute the practice, so frequently and empirically resorted to, of pouring into the ear the various nostrums—sedatives, and stimulants, calculated to allay pain in external parts. So rare is true neuralgia of the ear, that Dr. Kramer says, he "never observed ear-ache without evidence of inflammation either of the meatus or of the membrana tympani." Although I am not prepared to go the length of saying that such an affection does not occasionally exist, I must say that I cannot tax my memory with more than one or two instances of so-called "nervous otalgia," for which I have been consulted, that upon a careful examination I could not discover some direct *visible* cause for it: and I must, therefore, with Dr. Kramer, "deny to those persons the right of pronouncing a decisive opinion on the existence of a nervous otalgia, who do not understand investigating the membrana tympani in bright sunshine, and with the aid of the speculum, and who are not in the habit of doing it."

Usually coincident with the seizure of pain, the patient complains of *tinnitus aurium*, and the noises are described as a dull throbbing, or pulsation,—a loud pumping like that of a steam-engine,—with the occasional supervention of a sound varying in loudness and intensity from the ticking of a watch to the striking of a loud clock; but the most usual simile given by patients in describing those ear-noises is that tidal sound perceived on holding a conch-shell to the ear. In the severer forms of aural inflammation, patients very frequently liken this unpleasant symptom to the falling of water, the dashing of a cataract, or that peculiar rushing sound produced by the sudden escape of water through a large pipe or sluice-gate. In the more mitigated forms, and the

more advanced and chronic stages, we generally find the sounds of a hissing or blowing character, and usually likened to the singing of a kettle, the noise of a distant storm, the fluttering of the leaves of trees, the chirping of birds, the distant ringing of bells, a dull cooing in the ear, musical sounds of various kinds, the buzzing of bees, blowing of bellows, whistling, and other noises of a similar character, to which I have already referred at page 82. Any increase of the circulation, or nervous excitement of any kind, particularly in irritable patients, invariably makes these ear-noises worse.

Deafness—consisting either of impaired hearing or total loss of that sense on the affected side—comes on contemporaneously with the pain, or succeeds it in a few hours after; if, however, but one side has been attacked, the patient is not at first conscious of his loss of hearing. In some rare cases there is for a short time during the progress of tympanal inflammation an exaltation of the sense of hearing, in which (like photophobia in ophthalmia) all sounds become intolerable.

In severe inflammations of the ear, pain in the teeth of the affected side is no uncommon accompaniment; and pain from toothache, with or without decay in the last molar, is often referred to the ear. We should, therefore, carefully distinguish between these two causes. I think dentists too frequently, and without examining the state of the meatus, tell patients labouring under ear-ache to "wait until the teeth are set right." In cases of chronic ear-ache, the state of the last molar tooth should always be examined.

To these local subjective symptoms may be added the following constitutional ones: coryza, sneezing, coughing, and other symptoms of catarrh, increased heat of skin, headach with a feeling of weight in the head, and sometimes well-marked hemicrania; there is always great distress and anxiety of countenance; sleeplessness, restlessness; nocturnal exacerbations, the acute pain coming on at a particular hour; quickness of pulse, occasionally rigors, in some instances delirium, and even, in very bad cases, all the symptoms of cerebral disease, of which the case at page 238 is an example. The digestive organs are seldom much engaged in the progress

of the disease; the urine becomes high-coloured, and, towards the termination of the acute symptoms, deposits a copious pinkish sediment. The circulation, except in very severe cases, is seldom much affected.

The physical signs consist, in the severe cases, of heat, pain, and slight erysipelatous redness of the auricle: in very aggravated cases,—heat, fulness, and œdema, as well as pain over the mastoid region, and great soreness of the scalp on the affected side. In ordinary cases there is slight tumefaction of the lining of the external meatus; complete cessation of the cerumenous secretion; a bright pinkish colour; a swelling and polish of the lining of the auditory canal, which is streaked with long tortuous vessels, accompanied by heat and itching of that part, and all the symptoms of inflammation described at page 194. The membrana tympani first loses its polish, then its semi-transparency,—becomes in the early stages, and in very mild cases, of a dull yellow, but this is variable and seldom seen; the most usual colour varies through all the shades of red, from a slight pinkish hue to that of a dark damask rose tint, and is caused by the different degrees of vascularity produced by the greater or less intensity of the inflammation, the structures engaged, and the medium through which we see the vessels. In addition to the vascular arrangement figured and described at page 216, new vessels seem during inflammatory action, like as in the coats of the eye, to start into existence, and to branch and inosculate till the whole seems one mass of bright livid red. Generally speaking, the upper portion around the attachment of the head of the malleus is the first to become vascular, the last to regain the natural hue, and the part in which the colour becomes deepest. The vessels alongside the handle of that bone are always well marked, though the line of its attachment remains for some time whitish, owing to the intimate connexion of the membrane to it at this part. Around the circumferential ligamentous ring, particularly at its lower and anterior part, an areola of short vessels form a crescent of almost a line in breadth; they all run towards the centre, and, when well marked, look like the zone seen in iritis, or that observed in the edge of the cornea in the commencement of corneitis, to

which disease the appearances seen in myringitis bear a great resemblance. It is only in the early stage, or when the redness is disappearing, that this peculiar peripheral vascularity is well marked. With this general redness may, in some cases, be seen well-defined patches of ecchymosis, generally on the anterior vibrating portion; but as the vascularity increases, even the exact position of the manubrium cannot be recognised,—all is one red mass. The membrane also becomes swollen, and its surface apparently villous; rarely vesicles, and still more rarely pustules, form on its surface. Ulcers occasionally form upon it; these usually occupy the anterior part of the lower vibrating portion, but I have occasionally seen them situated posteriorly. It is possible that they may have commenced as vesicles or pustules, but we require more extended and minute observations to determine this point.

Exudation of lymph and muco-purulent secretion, with detachment of the cuticle, both from the surface of the membrane and the parietes of the canal, follow. Lymph is very frequently effused in the substance or between the laminæ of its proper fibrous tunic, and there can be little doubt that, in the severe forms of the disease, this morbid product is poured out in large quantity upon the surface of the tympanum, the membrane of which must partake largely of the inflammatory action so visible in the external septum. That these lymphy exudations—both by thickening the tympanal membrane itself, and by acting in a similar manner upon the lining of the cavity of the tympanum and the parts contained within it, by bands of adhesion within its walls, thus drawing inward and arresting the vibrations of the membrana tympani, curtailing the motion of the ossicula, injuriously affecting the membrane of the fenestra, and particularly by impairing the functions of those tympanic branches of the glosso-pharyngeal nerve which ramify on the mucous membrane—are the principal causes of deafness, I have little doubt. Perforation of the tympanal membrane, either by rupture, abscess, slough, or ulceration; but which it is not always easy to determine, also occurs occasionally. When rupture takes place, and that accumulations of blood, mucus, or purulent matter, pent up within the tympanum, are

evacuated, relief is generally experienced. In this condition—with the cavity of the tympanum open, polypoid growths occurring in the meatus, and granulating over the surface of the tympanum, and a copious and very often fetid discharge pouring both from the auditory passage and the drum—the case becomes one of otorrhœa, the peculiar symptoms and management of which are detailed in the chapter on that subject.

In cases where neither rupture nor ulceration has taken place, as the disease advances, the vascularity of the membrana tympani decreases, first in the centre of its vibrating portion, then around its circumference, and finally along the mallear attachment. The membrane assumes a muddy, yellowish, opaque colour; after this clears off we find it opaque throughout, or in spots; sometimes these opacities can be plainly discovered upon the interior of the membrane, like the speckled opacities seen upon the membrane of the aqueous humour. In other cases, the result of the inflammation is seen in the uniform greyish-white opacity, similar to leucoma of the cornea; and in time, as the superficial polish is restored, the membrane presents a pearly aspect very different from the semi-transparent character of the healthy condition.

A not uncommon effect of inflammation of the tympanum and its membranes, particularly when allowed to run its course unchecked, is collapse on a drawing inward of the membrana tympani, as explained at page 138. In such cases the handle of the hammer forms the most projecting point seen at the bottom of the auditory canal; and the anterior and posterior divisions of the membrane can be distinctly observed forming deeply curved folds upon either side of it.

The inflammatory process must, in severe cases, also extend into the mastoid cells; the periosteum lining the bony portion of the auditory canal will in time become engaged, as well as the pericranium over the mastoid process, and post-aural region of the skull, and present the symptoms already described. If allowed to proceed unchecked, by the efforts of nature or by art, the death of the bone beneath will follow; while, in cases still more severe, the entire petrous portion of the temporal bone will become inflamed,—the dura mater will separate from it,—purulent

deposit takes place in the cavity thus produced,—the brain, as well as its investments opposite those portions, will partake of the inflammation,—and death follow, either from abscess, or diffuse inflammation of the cerebrum or cerebellum.

In some rare cases, paralysis of the muscles of the face, on the affected side, presenting all the peculiar phenomena of that disease, is produced; instances of which will be related hereafter.

During the progress of the inflammatory action in the tympanum and its external membrane, the throat, in some cases, becomes engaged, its mucous membrane presenting a copperish-red appearance, and becoming swollen and infiltrated. The tonsils are also swollen; there is some difficulty of deglutition; and if an examination of the pharyngeal extremity of the Eustachian tube be made with the finger, according to the method described at page 80, considerable pain is experienced in the track of the tube, as well as in the middle ear. There can be little doubt of the inflammatory condition of the middle ear, extending over the Eustachian tube, and causing such thickening and obstruction of its lining membrane, with, perhaps, an accumulation of mucus, as greatly impedes the transit of air into the drum, and causes that peculiar feeling of stuffing, and occasional sudden bursting in the middle ear, of which we are all conscious when labouring under influenza or catarrh.

The nose sometimes partakes in the unhealthy condition of the neighbouring mucous membrane, and a feeling of stuffing in that part, together with much faucial respiration, is not an uncommon attendant upon acute inflammation of the middle ear and membrana tympani.

This form of inflammation chiefly attacks the young and middle-aged; one ear is much more frequently affected than both; the light-haired and fair-complexioned are more liable to it than the dark. So much more frequent are its attacks in spring than at any other period of the year, that it sometimes seems to be epidemic at that time. The duration of the disease varies from six to fourteen days, but may last a month, and its effects several months.

In the foregoing description it was impossible to avoid details and symptoms common to inflammation of the cavitas tympani—

true otitis—and its membranous partition, because the diseased action sooner or later extends from the one to the other.

With respect to treatment, the temperature in cases of acute myringitis should be strictly attended to: the patient should, if possible, be confined to a warm, well-ventilated apartment, or, if obliged to go abroad, the cold air should be carefully excluded from the ear; but in the severe form of the disease it is absolutely necessary to confine the patient to bed.

I have never had occasion to employ general bleeding; but local depletion, either by means of cupping or leeches, is invariably necessary; and leeches are not only the most effectual and easiest mode of abstracting blood, but they can be applied nearest the seat of disease, and repeated as frequently as necessary. To be effective they must be applied according to the directions which I have given at page 85, to which I would here particularly direct the attention of the reader. The auditory canal having been filled with cotton wool, to prevent them going in too far,* and the blood from flowing into it, five or six leeches should be attached round the external meatus, the direct vascular communication of which with the membrana tympani I have already pointed out at page 217. If allowed to scatter over the concha, they will not afford the same amount of relief: but several may be applied in front of the tragus, and others, if necessary, close into the angle between the auricle and the mastoid process. The bleeding should be encouraged by warm applications, stupes, and poultices, and, if necessary, kept up by relays of leeches for eight or twelve hours together. The relief afforded by leeches in this disease is often instantaneous, and is always most marked.

The employment of moist heat, as directed at page 89, will

* I knew one instance in which, from the omission of the cotton, a leech attached itself somewhere within the meatus, and caused the most excruciating agony. Although I generally mark the places to which the leeches should be attached with spots of ink, I have frequently the mortification of finding that they have been allowed to attach themselves to places far remote from the edge of the meatus. The apothecary should bring with him a large quantity of leeches, and employ the glass here figured of the natural size.



always afford relief. In addition I may mention, that applying the tube attached to a Mudge's inhaler to the external auditory passage, and allowing the warm vapour to have access to the inflamed parts, will give the patient great comfort.

When there is much external neuralgic pain, or rheumatic soreness and tenderness to the touch about the external ear, and over the side of the head and face, relief will be experienced from the various sedative applications, of which I may mention three, —tincture of aconite, chloroform, and the belladonna with compound camphor liniment. There are two popular remedies for "a pain in the ear" still in very general use,—the application of a roasted fig, and the insertion into the meatus of a hot roast onion or a clove of garlic. The former is innocuous, the latter is by no means harmless. The empirical practice of pouring laudanum and oil into the ear the moment pain is complained of, employed by the profession, is, I trust, on the wane.

The bowels should in this, as in all other febrile diseases, be opened, but the condition of the digestive organs does not appear to influence the inflammatory affections of the ear as much as they do those of the eye. The state of the skin, however, which is generally hot and dry, requires our more especial attention; and sudorifics are, in the early stage of the disease, decidedly indicated. Having leeched, fomented, and purged, James's powder, combined with small doses of blue pill and henbane, will be found very efficacious. Abstinence from animal food, and the use of the foot-bath, together with all such means as are calculated to allay inflammation and febrile excitement, should be had recourse to.

Counter-irritation, by means of small blisters applied upon the bald space behind the auricle, and below the lobe, are advantageous in the more advanced stage of the disease, and after local depletion has been fully employed. Generally speaking, blisters are too much relied upon, or applied too early in the disease; but as it advances they will be found highly useful.

Having resorted to all those means, we should, if the symptoms—not only of pain and deafness, but of the redness and vascularity of the tympanal membrane—remain unrelieved, at once have recourse to the use of mercury. Indeed I am now so fully

convinced, not only of the utility, but of the urgent necessity of employing mercury in these aural inflammations, that I do not hesitate to recommend its use in the early stages of all such affections. A pneumonia, a pericarditis, a peritonitis, an inflammation of a large joint or a serous cavity, or an iritis, may, it is true, get well by simple depletion, &c.; but will any experienced practitioner of the present day risk such a case without having recourse to mercury? For the reasons applicable in these instances,—from the peculiar effect which mercury exercises, not only in most inflammations, but especially over those of fibrous membranes; and in order to arrest the exudation of lymph, and to cause the absorption of those effusions which, by thickening the membrane, and causing those pathological effects to which I have already so frequently alluded, and which prove so constantly the cause of subsequent deafness; as well as the urgent necessity for arresting the progress of inflammation in a part that may prove destructive to life,—it is, that I so strongly advocate the employment of this remedy. I find that, in most instances, where it is employed early, it produces, as soon as it affects the system, as well-marked an improvement in all the symptoms as it does in any of the other inflammations which I have enumerated. It should, therefore, be given in small, frequently-repeated doses; and the formula I find most efficacious is calomel and blue pill, guarded with opium, and, if the stomach will bear it, a very small quantity of James's powder. Not only should the gums be touched, but the patient should be kept under its gentle influence for some days, in order to insure an ultimate beneficial result.

In the subsequent management of the disease, the iodide and bromide of potassium, or very minute doses of the bichloride of mercury in some of the preparations of bark, will certainly hasten the cure, as well as promote absorption of the deposits and adhesions already alluded to. The tinnitus which remains is more likely to be removed in time than that attending chronic deafness.

The state of the meatus and membrana tympani should be examined with a speculum daily, or oftener if necessary; and then, should we discover an ulcer, it may be touched with a solution of nitrate of silver applied with a fine camel's-hair pencil. If otor-

rhœa has occurred either in the form of muco-serous exudation, from the external surface of the tympanal membrane and the auditory canal, or owing to pus or mucus escaping from the middle ear through an aperture in the membrana tympani, or from abscess in the walls of the external auditory canal, we should remove the discharge by very gently syringing the part with simple warm water, or the most bland, unirritating fluid; but during the high inflammatory process no astringent injections whatever should be employed.

If polypoid growths of any magnitude sprout suddenly from the auditory canal, they should be removed with the snare, or touched with the solid nitrate of silver; and this latter, if properly done, does not give rise to any fresh attack of inflammation.

Should the mastoid process, or the parts covering it, become engaged, and that the methods already recommended fail to give relief, or that even an indistinct sense of fluctuation can be discovered, we should not long hesitate to make a free incision in the periosteum there, at least an inch in length. In performing this operation, the head should be firmly secured, and supported against some unyielding substance, as the back of a high chair, or the breast of an assistant. A stout scalpel is the best instrument to employ: the blade should be grasped by the fore-finger and thumb, so as to leave about an inch of it uncovered; and inserted steadily till the point reaches the bone, which it should be made to traverse for the full length of the incision. By this means we secure complete division of the periosteum. With regard to the line of the incision, circumstances may require its being made in other directions, but I find that it is most generally required parallel with, and about three-quarters of an inch from, the attachment of the auricle, in order to avoid the posterior aural artery, which, when divided, bleeds profusely. The knife should be drawn from below upwards; and from the swollen state of the parts, the depth which we are sometimes obliged to introduce the instrument is often nearly an inch. The hæmorrhage, unless we wish to extract blood, may be arrested by placing a dossil of lint within the incision. The cut surfaces generally present the brawn-like appearance seen in phlegmonoid erysipelas. Although

pus may not have been reached by the incision, still immediate relief is almost invariably experienced. The subsequent management of this particular part of such a case must depend upon the circumstance of exfoliation, &c.

The following cases exhibit many of the phenomena detailed in the foregoing description. They are given at somewhat greater length than would be necessary, were the diseases of the ear as much attended to by the general physician or surgeon as they ought, or if the treatment of those diseases formed a part of the present system of medical education in these countries.

Acute myringitis and tympanitis in both ears, with severe head symptoms; recovery under the use of mercury.

Master J—, aged twelve years, with light hair and florid complexion (whose elder brother had been under my care a short time previously for chronic inflammation of the left, and acute inflammation of the right ear), had always enjoyed good health, and never had any aural affection, till Sunday, the 1st of August, 1847, when he was attacked with slight pain in the right ear. Upon the Friday previous he had bathed in the open sea five times, and had dived frequently each time. Upon the day following he bathed three times, and also dived. He awoke on Sunday morning early, with some pain in the right ear, but made no complaint, as he says it was but slight; it was accompanied, however, by a feeling of pressure, as if something was bursting out through the ear. He bathed, however, again, twice upon that day. Towards evening pain came on in the left ear, and increased greatly in the right. He retired to rest early, and having been reminded of the provocation for his pain, he made no further complaint. About twelve o'clock that night, however, his mother was awoke by his cries and moans, the result of the extreme agony which he was then suffering. A neighbouring practitioner was applied to, and some camphorated oil and laudanum dropped into the ear. This treatment, however, afforded him no relief, and he remained awake all night, moaning much, and complaining of the violent pain in his head and ears, which he likened to a sharp instrument penetrating from without.

I saw him on Monday morning, the 2nd, about ten o'clock;

the face was flushed, and the countenance anxious and expressive of extreme pain. The pupils were rather more contracted than natural, and the eyes slightly sensitive to light; he had some heat of skin, but the pulse was not above 76; the bowels were constipated, and the urine natural. The auricle and external meatus were normal; considerable pain was experienced upon pressing the cartilage behind the articulation of the jaw, but pressure over the mastoid region was borne with impunity. The auditory canal was a light rose colour, quite dry, and devoid of cerumen; the membrana tympani was distinctly seen, with a deep pink colour generally diffused over it, but increasing in intensity in a crescentic form round its lower insertion, and also in the line of the attachment of the malleus. The appearances were nearly the same on both sides. As this boy was brought to my house, I had a better opportunity of accurately recording the state of the parts than one is usually able to effect in the sick chamber. The appearance of the throat was normal; the finger pressed against the mouth of the Eustachian tube caused but slight increase of the pain. Air passed up with difficulty into the tympanal cavity on making a forced expiration. Hearing was then unimpaired.

He was ordered to be put to bed; to take a purgative bolus, and to have two leeches immediately applied to the posterior margin of the external meatus, as far in as possible, on both sides. The leeches afforded some relief, but towards evening the pain returned with great violence. He became quite delirious about six o'clock; did not know his friends; and could with difficulty be retained in bed. I saw him about eight o'clock; he was then in high fever, but more sensible; there was great heat of skin; pulse 80, and fuller than in the morning; tongue clean; bowels had been fully opened; urine free and limpid; no thirst; knows all his friends now, but does not pay much attention to what is going forward about him; is quite rational when spoken to; complains of intolerance of light; face has become more flushed and anxious; complains now of the great weight of his head, which he rolls about from side to side; has had no sleep. On examination I found that the redness of the passage and membrane of the drum

had greatly increased since morning, but there was no tumefaction of either. Pressure or percussion of the mastoid process, and the infra-aural region, was borne without wincing. Two more leeches were ordered to be applied over the articulation of the jaw, in front of the tragus upon each side, and small doses of calomel, opium, and James's powder to be administered every third hour. The ear to be steamed over hot water, and a linseed poultice to be applied subsequently. Scarcely any diminution of hearing.

3rd. Has passed a sleepless night, raving occasionally. All his previous symptoms continue unabated, in addition to which, he now, for the first time, complains of noise in his ears, which he likens to that of the tide, and which is, he says, generally diffused through the head as well as in the ears. The pain has somewhat increased; he says he feels as if a lance was running into his head; bowels free. Blisters ordered to be applied behind the ears upon both sides. During the night of Tuesday he again became violent, and did not know his friends. The urine became remarkably dark-coloured. He had no sleep. The mercury was steadily persevered in, and towards morning he complained of some soreness of his mouth and gums.

4th. He passed another sleepless night; raved occasionally; countenance less anxious; pulse not so full; pain in ears and head very much less; mercurial fetor; mouth slightly sore; complains of pain in swallowing, which he refers to the middle ear. He has become very deaf; says the noise has increased, and is now of two kinds,—a continuous, uninterrupted bellows sound, and an occasional ticking, like that of a loud watch, which commences and stops suddenly; membrane and passage unaltered. Interval between doses of mercury increased.

5th. He is much better in every respect; has had no delirium since last report; lies quiet on his side; he is remarkably tranquil, and has had some sleep; the light is still offensive to him; skin cooler; pulse 80; bowels free; mouth very sore; deafness still continues; noise in head not so violent; urine high-coloured; the membrana tympani and auditory canal are much less red. Mercury omitted; the occipital region was ordered to be shaved, and

two small blisters to be applied behind the insertion of the mastoid muscles. His chief complaint now is of the soreness of his mouth from the effects of the mercury.

6th. At eleven o'clock this morning he was suddenly attacked with acute pain in both ears, of a sharp lancinating character. Leeches were again applied round the meatus on both sides, and warm stupes and fomentations also had recourse to. These means afforded him relief in a short time.

7th. Has slept well during the previous night; had no return of the acute pain, but a dull aching still continues in both ears; he is very deaf to-day, but he is not so sensitive to light; the bellows noise still continues in his ears, and that which was formerly described as the ticking of a watch, he now likens to the clapping of two pieces of iron together. He only hears an ordinary ticking watch when it is pressed against the auricle of the left side, not at all on the right; he does not hear it when applied to the forehead, or held between the teeth, and but very faintly when applied upon the mastoid process. He complains of a return of the weight in his head to-day; sleeps much; bowels free; urine of a dark brown colour, and depositing a pinkish sediment; mouth very sore. Upon the visit at four o'clock in the evening the countenance was found more tranquil than on any previous occasion; the skin cool; pulse 75; functions natural: pressure on the tragus is now borne with impunity. Upon inspection, the membrana tympani was found much less red, particularly on the left side; it is also beginning to clear above the malleus; mouth still very sore; ordered a gargle, and to have light broth.

9th. Much better in every respect. A slight muco-purulent discharge now appears from the meatus of the right ear. On removing this with a little tepid water, and bringing the membrana tympani within the field of the speculum, the redness was found to have greatly disappeared, except on two or three spots, about the size of pin-heads; all the intermediate portions of the membrane had become white, and apparently thick and pulpy. Upon the left side a slight mucous discharge coats over the surface of the membrane of the drum, and the inferior portion of the canal; having removed this with a little cotton on a probe, the vascularity

which had previously appeared on those parts was found to have greatly diminished; but the membrane itself had become thickened and opaque. He is quite free from pain; the hearing distance has increased to about two inches on each side. On the right side two small glands have now appeared beneath the lobe, and another slightly enlarged over the mastoid process; ordered three grains of the hydriodate of potash three times a day, and nutritious diet.

12th. Has very much improved in every respect since last report; is now quite free from fever, but very weak and languid; tongue clean; soreness of mouth quite removed; pulse 60; has some appetite; sat up for a short time yesterday; glands in the neck much lessened, that over the mastoid process still tender; is quite free from pain in the ears, but still complains of a slight, generally diffused pain in his head; there is no intolerance of light; hearing distance has increased to eighteen inches on each side; has had no discharge from either ear; the loud ticking noise has quite disappeared, but the buzzing or bellows sound is still slightly perceptible; any surrounding noise is particularly distressing to him; he says he feels as if it struck his ear. Upon examination of the right ear, the passage is found to be quite dry, and of a light pink colour; the membrana tympani generally is somewhat redder than on the occasion of my former visit; and, besides this generally diffused redness, there is a deep-coloured ring of vessels to be seen, forming a crescentic band about a line in breadth, occupying the lower portion of the membrane, the vessels of which can be distinctly seen running in nearly straight lines from the circumference towards the centre. The projection of the malleus is marked by a fasciculus of dark red vessels, running along the course of its attachment. In the left ear the general redness of the passage and the membrane is not so great, and there is no ring of vessels such as exists upon the right side. He states that, on blowing his nose, he felt as if something gave way in his right ear, and that immediately his hearing increased, and on repeating the experiment a few times, the same phenomena took place in the left ear. Since then his hearing has gradually improved to the present time; he was ordered to be blistered again behind the ears, to continue the

use of the potash, to sit up for a few hours every day, and have nutritious diet.

16th. Has continued to improve; hearing has increased to three feet upon the right, and four feet upon the left, side. The right membrana tympani is found much less vascular but somewhat more opaque than the left, which is still of a uniform pinkish colour, but has, nevertheless, regained its polish and semitransparency much more than the other. The buzzing noise is still slightly felt. The blisters were repeated, and the potash, with tincture of iodine, continued; slight open air exercise permitted.

18th. From the general improvement in his health, he was enabled to visit me at my house on this date. He states that the buzzing and all other noises have completely disappeared. The membrani tympani on the right side is found to have lost much of its vascularity, but is uniformly opaque, and is also dull upon its surface; with this ear the hearing distance is now four feet, whereas with the left, which is still very vascular, but much more transparent, the hearing distance is now full six feet. A generous diet, and the potash and iodine ordered to be continued.

Sept. 25th. His general health is now quite restored; his hearing as good as ever; the noise has entirely disappeared. During the past month a blush of redness has several times appeared upon the left membrana tympani; still his hearing distance with that ear is somewhat greater than on the right side, in which the membrane is not vascular, but is slightly opaque.

The constitutional symptoms in this case were more than usually severe, and such as might lead the practitioner to suppose the brain or its membranes were engaged. We also learn from this case that inflammation of the tympanum and its membrane may produce such a degree of deafness as that the watch cannot be heard, even when *applied* to the ear.

In all probability the inflammation commenced and was originally confined to the tympanal membrane, and afterwards extended to the middle, and, possibly, the internal ear.

From the latter stage of this boy's case we also learn a fact worthy of observation, namely, that it is not the amount of vas-

cularity, but the degree of thickening and opacity in the membrana tympani, which produces the deafness.

The next is a case of acute myringitis and tympanitis of one side; and immediate recovery under the use of mercury.

C. L., a female, aged 21, applied at the hospital at ten o'clock on the morning of the 18th of April, 1846, for an attack of intense pain in her right ear. She states that she has not been "regular" for the last six weeks; that she was attacked four days ago with catarrh, attended with considerable stuffing in her nose, and the other usual symptoms of that affection; that she had walked along the sea-shore the day before, with a cold wind blowing upon her right side. She went to bed tolerably well last night, but awoke at three o'clock this morning with a violent beating pain in her ear, accompanied by a loud noise, which she likens to the "puffing of a steam-engine;" the pain resembles that of a sharp instrument penetrating through her ear into her head, which she describes as most excruciating. She had also some pain and soreness over that side of the head; she felt some difficulty of deglutition, owing to the pain it caused her. Coughing, sneezing, or any motion of the temporo-maxillary articulation, greatly aggravated her sufferings, and gave her a feeling of bursting in the middle ear.

She rose at seven o'clock, felt great sickness of stomach, and had a well-marked rigor whilst dressing. She immediately applied to a neighbouring practitioner, who put some "drops" with a piece of cotton into her ear, which only aggravated her symptoms. Her pain still continues, and the noise has increased; there is slight redness and great heat of the auricle. The pain is increased on making pressure over the tragus in front of the meatus; on pressing or percussing the mastoid process slight pain is also complained of. The pain in her ear, however, is not increased by these means, nor is it referred to the tympanum. She has no pain beneath the meatus, nor behind the angle of the jaw. The hearing distance, with an ordinary ticking watch, is scarcely three inches in the right ear. On closing the meatus of the left side, the noise is greatly increased. On examination with a spe-

culum, the auditory canal is found highly vascular, dry, devoid of cerumen, and exceedingly tender to the touch. The membrana tympani has lost its polish, and is of a bright, florid, generally-diffused red colour, spotted with small patches of a deeper hue, like minute ecchymoses. The projection of the malleus can be recognised, of a darker colour than the surrounding parts, with a whitish line in the centre. Below the malleus, and towards the posterior part of the membrane, a well-defined vesicle, about the size of a grain of mustard seed, and filled with a brownish fluid, can be seen. Upon holding the mouth and nose, and pressing the air into the Eustachian tube, she experiences considerable difficulty in making it pass up upon that side, while it passes with facility into the tympanum of the left. The ear, or a stethoscope, held to the right side during this operation, readily perceives, as soon as the air reaches the tympanum, a squeeling and gurgling sound, as if the air passed not only through a narrow passage, but through a fluid-like mucus. This pressure of air into the tympanum greatly aggravates her symptoms.

Upon looking into the mouth, the fauces, uvula, and back of the pharynx are found nearly of their natural colour. Upon inserting the forefinger of the right hand into the mouth, and pressing its point upwards, backwards, and outwards, towards the mouth of the Eustachian tube, considerable increase of pain is experienced in the middle ear. The tongue is coated; the pulse regular; but there is heat of skin, and considerable anxiety of countenance. The left ear is natural in function and appearance. This patient suffered from rheumatism of the upper extremities some time ago.

Four leeches were applied around the meatus, as far in as possible, and four in the depression in front of the tragus. She was ordered to foment and steam the ear over hot water, placed in the bottom of a long narrow mug, frequently during the day; and a purge was administered.

19th. States that she received immediate relief from the leeching. The countenance is less anxious, and she slept well all night; the noise of a steam-engine is altered to a gurgling sound; the pain and all other symptoms are relieved; the membrana

tympani, however, remains nearly the same in colour, but the vesicle has become flaccid. She was put on the use of calomel and opium in small doses frequently repeated; a blister was applied over the mastoid process; the fomentation and warm vapour was ordered to be continued, and a linseed-meal poultice to be applied to the external ear at bed-time.

20th. Continues to improve. Noise changed to that of the ringing of bells; the pain, on pressing the mouth of the Eustachian tube, is much less; the membrana tympani is less vascular; the general symptoms have all improved; the mercury to be continued.

21st. All the symptoms relieved; the mouth is slightly sore; no pain on pressing anywhere around the ear or meatus; all heat and vascularity of auricle is removed; the membrana tympani has lost its vascularity, but is slightly more opaque, and whiter than natural; the vesicle has quite disappeared; three or four large vessels can still be seen coursing along the handle of the malleus. Upon forcing air through the Eustachian tube into the tympanum, a slight gurgling noise can be perceived in the middle ear, and of the peculiar sensation which it imparts the patient is quite conscious. During this operation, and while the membrane is within the field of the speculum, a slight blush of redness, of a pinkish hue, is observed to be produced in the membrane. The hearing distance has increased to four inches. A copious red deposit was observed in the urine. She has been slightly purged by the mercury; ordered to lessen its dose to one pill night and morning.

23rd. Continues to improve in hearing; noise as before; she has had no return of pain in the ear; the pain and soreness in the head gone; no flying pains or other rheumatic affection; the mouth is very sore: ordered to omit the pills, and take the sixteenth of a grain of oxymuriate of mercury with decoction and tincture of bark three times a day; generous diet.

25th. Continues to improve rapidly; membrana tympani is more transparent than upon last examination. Hearing distance is increased to twelve inches; slight pain is still felt on pressure over the lower portion of the mastoid process, and opposite the point of the styloid process, in which latter place it is still increased on coughing. Ordered to continue the oxymuriate and bark, and to apply another blister.

All her symptoms have now disappeared, with the exception of a slight buzzing occasionally; the hearing is perfectly restored.

Four months later I had an opportunity of examining this young woman again; her hearing had been quite restored; but she said that she occasionally suffered from a slight "ticking noise." The membrane of the drum upon the affected side presented a slightly mottled appearance, particularly towards its lower edge, but without an opacity of any account; her hearing distance is two feet less upon the right side than the left.

March, 1851. She had a slight attack of pain in the right ear, accompanied by some deafness and redness of the membrana tympani, all of which were at once removed by the application of leeches.

January, 1852. She has not had any return of pain or deafness; parts natural; hearing normal; no tinnitus.

INFLAMMATION OF THE MEMBRANA TYMPANI AND OTITIS.

Case of severe rheumatic inflammation of the membrana tympani and cavity of the tympanum, with periostitis, polypus, &c.

Mr. F., aged 49, with light hair and fair complexion, suffered several years ago from a severe attack of rheumatism, in which his heart was affected, caught while exposed to a cold wind upon the top of a coach during a long journey; since that period he has been very liable to catch cold, in the head particularly, whenever the feet are exposed to damp or low temperature. These attacks of catarrh were characterized by violent fits of sneezing and running at the nose, &c.; latterly his sense of smelling became greatly impaired, and he perceived a stuffing in the right nostril which rendered him very uncomfortable. During the summer of 1846 he was attacked, in addition to the catarrhal affection, with cough, expectoration, and other symptoms of bronchitis. Having recovered from this, he remained in good health till January, 1847, on the 28th of which month, during a period of very wet and severe weather, his present attack commenced. His own words are: "About this period I wore a muffler about my neck; one sharp morning I walked into my office, laid it aside on my arrival, and,

being called off suddenly to the Four Courts, I forgot to put it on again. On my way there I felt a blast of sharp, cold air strike my throat on the right side, under the ear, but I did not pay much attention to it, and remained in Court most of the day, with my hat off occasionally. About two o'clock I felt a slight pain in the right ear, and got a bit of cotton wool put into it; about six o'clock I returned home from my office. I called at my apothecary's, who dropped some warm oil and laudanum into my ear, which, for a time, lessened the pain, but did not completely remove it; but I was enabled to resume my business as usual next day."

Mr. Collins, to whom Mr. F. first applied, writes to me as follows: "When Mr. F. first called upon me he complained of pain in his right ear, and also of slight shooting pains about that side of the head; he looked a little dull and heavy, but there was no fever, quickness of pulse, headach, deafness, or other symptoms of importance present. I considered his attack to be of a rheumatic or neuralgic character, particularly as he had suffered a few years before from severe rheumatic fever; and as the pain in the ear was what he most complained of, I dropped some tincture of opium and olive oil into it, and applied a bit of wool to prevent its coming out; I also ordered him an aperient. Upon the next evening Mr. F. again applied to me on his return from Court, and stated that he had derived relief from the drops until he was again exposed to cold and draughts that day: the drops were again applied and with relief. The next day Mr. F. resumed his usual avocations, but the pain continued to increase, and four leeches were applied behind the ear, and a poppy fomentation and a poultice applied with considerable relief, though some slight pain still remained in the ear and the side of the head. His sense of smelling now returned, and continued perfect for a few days, when it was again lost. Mr. F. confined himself to the house for the next two or three days, but would not consent to do so longer, as he felt much relieved of the pain, and business of great importance required his attention at his office. In a few days from this date his former symptoms returned, to relieve which he was strongly recommended by a non-medical friend to drop into the ear a lini-

ment of oil of turpentine and oil of cinnamon, which I prepared for him, but, having experienced no benefit from this, he applied to you."

I first saw this gentleman upon the 13th February; he complained of acute pain in his right ear, which, as appears from the foregoing account, had continued off and on during the previous fortnight. The pain he described as " shooting from the ear to the temple and top of the head, accompanied with a boiling and pumping noise, like that of a steam-engine;" the pain also appeared, according to his own description, to reach to the throat, without making the throat sore; it was increased by sneezing, but relieved by pressing the hand upon the ear and side of the head. The auricle was hot and somewhat swollen; the lining of the meatus and auditory canal was red, tumid, and completely devoid of cerumen; the introduction of the speculum, and the examination, caused a good deal of pain from the tenderness of the parts; the membrana tympani was of a dark, brown-red colour, had lost its polish, and appeared to be swollen and pressed outwards: the projection of the malleus could not be discerned; pressure in front of the ear gave a good deal of pain, but there was no tenderness over the mastoid process. Rest, abstinence, confinement to the house, constant fomentations, leeches round the meatus, with small doses of blue pill, James's powder, and hyoscyamus, at night: and an aperient in the morning, was the treatment resorted to during the next few days.

Upon the 19th, his symptoms, with the exception of the pain in the ear, continued much the same; he had also flying pains of a rheumatic character in the side of the head, the wrists, feet, and generally throughout the body. The pumping and boiling noise remained unabated: the deafness now became complete upon that side. The appearance of the ear continuing unchanged, except that the meatus was more swollen, it was deemed advisable to place him under the influence of mercury,—an opinion in which Dr. Stokes, who saw him with me, at that time concurred. He was accordingly, but with some difficulty, mercurialized by means of small and frequently repeated doses of blue pill, calomel, and opium. When his mouth became sore, the pain in the ear and

the noise lessened somewhat, and the general rheumatic affection disappeared; but the meatus and auditory canal now became so much decreased in caliber, owing to the thickening of the lining of these parts, that it was not possible to gain more than a glimpse of the red and swollen membrana tympani. The leeching and blistering were continued, and the surfaces denuded by the latter were dressed with extract of belladonna and mercurial ointment.

March 10th. The cuticle became detached, and a slight muco-purulent discharge took place from the external meatus; the ear was then syringed with plain tepid water; he was allowed a more generous diet, and placed upon the use of the hydriodate of potash, with infusion of bark and tincture of orange peel. His general health now improved; he slept better, and was able to go abroad and take exercise; the discharge, however, continued to increase, and emitted a very offensive odour; and, at the same time, he began to complain of a deep-seated soreness all over the side of the head, behind the ear, but particularly over the mastoid process and immediately below it. Towards the end of March, upon examining the ear carefully under a good light, a small polypoid excrescence of a light red colour, growing from the posterior wall of the canal, and completely filling up that cavity, was detected; this I removed with the wire snare, and the discharge then lessened; the soreness of the side of the head, the pumping, and the deafness, however, remained the same. Pressure over the mastoid process and the post-aural region of the head, very much increased the soreness, and it was now evident that the periosteum covering these parts was inflamed.

During the latter part of the month of April, and all the month of May, the symptoms of periostitis remained much the same, and the scalp itself became inflamed, having a dusky, red hue, pitting on pressure, and feeling excessively sore to the touch. The treatment consisted in the frequent abstraction of blood from the affected part by means of a few leeches, and a small cupping-glass applied over the leech-bites; poulticing, inunction with different ointments, both of a sedative and absorbent nature, slight vesicants, &c., and change of air. Bark, potash, and iodine were also taken with a view to improve the general state of the constitution.

He had no headach, rigors, or perspirations, and his sleep and appetite were tolerably good; still, however, the pain continued, and the dusky redness and tumefaction of the scalp remained, although there was no evidence of suppuration. It was determined, in consultation with Mr. Cusack, to make an incision down to the bone, and thus free the periosteum, and give exit to any matter which might be contained beneath it. Accordingly, upon the 29th of May, I made a perpendicular incision, about two inches long, nearly parallel with the posterior margin of the auricle, by inserting a sharp-pointed scalpel down to the bone at the point of insertion of the mastoid muscle, and carrying it upwards and a little backwards. The bone did not feel rough or gritty under the knife. A pledget of lint was inserted into it; and when the hæmorrhage had ceased, a linseed-meal poultice was applied over it. The wound suppurated kindly, and all the surrounding soreness of the scalp and pain on pressure soon disappeared. As the discharge from the wound increased, that from the meatus lessened, and in about ten days the wound itself healed without any exfoliation of bone. The pumping noise now ceased altogether, the discharge from the ear also lessened very much, and all uneasiness in the parts ceased.

During the month of July, and till the 12th of August, I only saw Mr. F. occasionally. Upon examining the ear carefully at this latter date, I perceived that the meatus had regained its natural size, and I discovered another second small polypus in the situation of the first; this I also removed, and Mr. F. came to me in a day or two to inform me that the discharge had now ceased altogether, and that the hearing had returned the night after I had extracted the polypus. He could now perceive the ticking of a watch at the distance of an inch from his ear, although he was quite unconscious of it when pressed against the auricle the day I last saw him. I could now distinguish the membrana tympani perfectly; it was of a dull white colour, evidently much thickened, but not perforated in any part.

September 3rd. He has continued to improve in every respect; his health and spirits are quite restored; all discharge from the ear has ceased; the tinnitus aurium now consists in a slight "booing" which appears occasionally: the hearing is slowly returning.

The snuffling and loss of smell I now found to be caused in a great measure by a small gelatinous polypus which filled up the cavity of the right anterior naris, upon removing which, both the nasal respiration and the sense of smell were much improved.

This case is instructive, as showing the rheumatic character of some of the inflammations of the ear, and as exhibiting the occasional failure of the mercurial treatment to cut short the disease, particularly if it has advanced to any height, as this had. The discharge came from the external ear and the polypus. This morbid polypoid growth, thus appearing during the progress of an inflammation, should always lead the practitioner to suspect mischief going on in the neighbourhood, and should cause him to examine with great care the condition of the mastoid process and its coverings, although neither the existence of a polypus, nor the fœtor or dark colour of the discharge, are of themselves a sufficient proof of caries or denuded bone. The appearance of periostitis, even at this late period, is not an unusual consequence of violent otitis; the inflammation may spread from the periosteum lining the bony portion of the meatus; or the mastoid cells may, and often are, the seat of inflammation, and this inflammation may extend from the layer of bone which covers them to the periosteum. If not relieved by such local and general means as were made use of in the early part of the foregoing case, the surgeon should not hesitate to cut down upon the covering of the bone, and divide it fairly for an inch or more of its length. Almost immediate ease follows this operation, even though we fail to discover the existence of pus; and, moreover, delay after a certain period may prove fatal. A thin shell of bone is occasionally thrown off in such cases, but not always. Generally speaking, the otorrhœa lessens when the discharge from the wound is fully established, although there may not be any communication whatever between the parts from which these discharges come. When this pain over the mastoid process appears early in the disease, and is accompanied by an erysipelatous redness and œdema of the scalp, we should not hesitate in having recourse to incision immediately.

We have in this case another remarkable example of a mechanical impediment, such as the polypus, so completely obstructing

sound, that a watch held to the ear was not perceived, although hearing returned within a few hours when that mechanical obstruction was removed. There can be little doubt of the middle ear having been engaged in this inflammation, yet we have no evidence of perforation of the membrane of the drum having taken place. The only treatment subsequently employed with Mr. F. was that of occasionally washing over the auditory canal and membrana tympani with a solution of nitrate of silver.

SUB-ACUTE MYRINGITIS.

Besides the acute form of the disease, attended by violent pain, &c., already described, there is a description of *sub-acute inflammation** of the membrana tympani, with which I have been long familiar, and which, although perfectly painless, is equally destructive to hearing. It generally appears in persons between 15 and 30. The first symptom to which the patient's attention is directed is deafness, which has appeared rather suddenly. It may be, but is not necessarily, accompanied by tinnitus; but there is always a feeling of stuffing in the ear; the same stuffing is felt in the nose and frontal sinus; the patient complains of there being a veil between him and the sound. The tympanal cavity is usually free; and when it is not, blowing the nose or sneezing sometimes suddenly restores the hearing: and this is one of the causes why the disease is so frequently neglected, the patient expecting a similar effect from day to day. The nature of the disease is only to be learned by a careful inspection of the membrane, which, if we see the disease early, is always of a pink colour, of a tint somewhat paler than that of the monthly rose. Through this, dispersed in various directions, we may observe in some cases a few long, tortuous vessels. The transparency and polish of the membrane are seldom much affected at first. The auditory canal does not usually exhibit signs

* Dr. Kramer has, in the latest edition of his *Ohrenkrankheiten*, found much fault with my classification of the inflammations of the membrana tympani. Upon a careful revision of my opinions, and five years' additional experience of these diseases, I see no reason to discard any of the forms of disease which I originally published, although the present arrangement is somewhat different. Had Dr. Kramer accustomed his eye to distinguish the different ophthalmic inflammations, he might have been able to appreciate the various shades of colour on the membrana tympani.

of disease, but the cerumenous secretion is arrested. Generally speaking, there are no constitutional symptoms present, and when tinnitus is an accompaniment, it is usually of a very light character, resembling a slight buzzing or singing. If allowed to proceed unchecked, the membrane becomes thickened and remarkably opaque, from lymphy deposits, and the deafness which ensues is of a most irremedial nature. Collapse or drawing inwards of the membrana tympani does not usually follow this form of the affection, but ulceration, even to perforation of the membrane of the drum, is not an uncommon attendant upon it.

This disease is slow in its progress, and requires very careful watching. Cases of this nature have been, I feel convinced, repeatedly treated as "nervous deafness." I am inclined to think that it is a true myringitis, in which the inflammation is seated in the fibrous layer of the membrane. In this disease mercury is just as necessary as in that already detailed; it should, however, be given after a different fashion: to be effectual, it must be slowly introduced into the system, so as to produce a steady and gradual effect. The mouth should be kept sore until there is a decided improvement both in the vascularity and in the hearing, or until all hope of restoration has been abandoned, or other circumstances induce us to relinquish this mode of treatment. After the constitution has been fully affected by the mineral, the bichloride, given in doses from the sixteenth to the eighth of a grain, dissolved in proof spirits, and taken in half an ounce of the cold infusion of bark, and a scruple or half a drachm of Huxham's tincture, three times a day, will be found highly efficacious. The preparations of iodine are also, in the advanced stages of the disease, worthy of trial; but I do not think that the preparations and combinations of iron produce in aural inflammations the same benefit which they do in constitutions labouring under ophthalmic affections of a like character.

Counter-irritation over the mastoid process, change of air, removal to the sea, and generous living, will hasten the cure.

To relieve tinnitus aurium, after the inflammatory action has been subdued, or the original disease which produced it has subsided, and particularly in cases where we find this symptom pre-

sent without any apparent lesion of the parts we are able to inspect, I have found the preparations of the Arnica montana of decided benefit; indeed it is the only medicine with which I am acquainted that seems to possess a specific power over this annoying and usually most intractable complaint. The preparation I find most efficacious is the tincture both of the flowers and leaves, of which the patient should commence by taking fifteen drops in a table-spoonful of the infusion of Arnica, with some cordial tincture three times a day. After a few days the dose should be increased one or two drops daily, till it reaches thirty, or even more, unless headach or giddiness be produced, when we should at once lessen the dose, or omit the medicine altogether for a short time.* The state of the bowels should be carefully attended to during the administration of this drug.

So long as any vascularity or recent deposit exists in the membrana tympani, notwithstanding manifest improvement of the hearing, we should not desist from employing means to remove it, as these cases are of a most insidious and protracted character. When ulceration exists, we should touch the part daily with a solution of lunar caustic, applied with a fine brush.

In all the inflammations of the middle and external ear, the secretion of cerumen is arrested, and it is long after the disease has been relieved, that the cerumenous glands resume their healthy functions, the auditory passage remaining dry and its lining scaly: or the wax which is produced being insufficient in quantity, of a very dark colour, and soon becoming hard and inspissated. This deficiency of cerumen, which is but a symptom, is often set down as a disease, and various applications, such as ox-gall, creasote, glycerine, &c., have been recommended to restore it. I find, however, that nothing produces a healthy action in the parts so soon, while, at the same time, it immediately supplies the best artificial

* The following is the formula for the tincture:—One ounce and a half of the *flowers* to a pint of rectified spirit of wine; macerate for fourteen days and strain; or, of the *leaves*, the same quantity infused for a similar period in proof spirits. In prescribing these I usually order them in equal proportions.

Dr. Neligan says: "This tincture may be readily prepared by percolation, having previously macerated the flowers with a little of the spirit for twenty-four hours; or it may be prepared with the cut and bruised root in the proportion of ℥ii. of the root to Oj. of rectified spirit. Dose, f. ℥ss. to f. ℥ii."—*Medicines and their Uses.*

succedaneum, as the soft brown citrine ointment, applied to the auditory passage in a melted state with a soft brush.

The following case affords a good example of the sub-acute form of the disease, of the inattention paid to the early symptoms of deafness by practitioners in general, and the efficacy of anti-phlogistic treatment. As the subject of this case, Mr. S., then aged 19, was a gentleman of very great intelligence, I give the history of his case, as far as possible, in the words of the narrative with which he has furnished me: "About the year 1836 I felt symptoms of deafness in both my ears for the first time, but on the application of blisters these symptoms passed away. From being but a child at the time, I have an imperfect recollection of the peculiar symptoms of my case. Again, in 1840, I became quite deaf in my right ear: this I mentioned to our family physician, but for some time he treated it as a joke, telling me merely that I was idle and wished for some holidays; however, on my frequently asserting that I really *was* deaf, he directed me to syringe my ear night and morning, and afterwards he dropped some liquid into it which he prescribed for me, but he did not make any particular examination of my ear. I continued to follow his advice for some weeks, but without any beneficial effect. I was then advised to get some rusty bacon, cut it into small shreds, and put one, morning and evening, into my ear,—but with no better success.* At last I applied a blister behind my ear, and kept it open for six months. This treatment, which may, and very probably would, as experience has since shown me, have been successful, had it been resorted to in the first instance, was then of no avail. On two subsequent occasions, about Christmas, 1841, and July, 1842, I had an ear-ache in that ear, and the only application which gave me relief was dropping warm laudanum into it.† At the close of September, 1845, I felt my left ear one

* This is a very popular remedy in Ireland, and is frequently prescribed by medical practitioners. In cases of deafness solely the result of a deficiency of cerumen (very rare cases, by the way) it is innoxious, and may be effectual, but in no other case that I am aware of is it at all applicable.

† Laudanum dropped into the ear is one of the most popular remedies for ear-ache, and in many instances it affords relief. I do not object to its application as a means of lessening pain, but I do as a remedial agent, while the *cause* of the pain is uninvestigated, and not treated according to the established rules for lessening inflammation, &c.

morning as if it were stopped, and perceived a buzzing sound in it, such as one feels on applying a sea-shell to it. This noise was increased at night when I lay in bed; it then resembled a constant loud hissing. I became very deaf, and my difficulty of hearing increased daily; I also experienced an uneasy sensation, and a feeling of stuffing, in this ear, but no pain."

On the 21st of the November following I first saw this young gentleman. I found, in addition to the symptoms already described, a bright pink hue diffused over the left tympanal membrane, which, however, had not lost its polish, nor become opaque. He was with difficulty able to inflate the drum, and when he did so, the stream of air caused a slight squeeling and a mucous gurgling in the middle ear. The external meatus on both sides was dry, devoid of cerumen, and somewhat redder than natural. The throat was normal. It was evidently a case of sub-acute inflammation of the membrana tympani, of the mucous membrane lining the cavity of the drum, and the Eustachian tube: with mucous engorgement of the middle ear. Upon the right side the membrana tympani was thickened and opaque, and two or three large red vessels spread over its surface, but the air passed up with facility. Six leeches were immediately applied to the left ear, three round the meatus, and three in front of the tragus, and warm stupes and fomentations prescribed.

Upon the 29th his symptoms remained unabated and the appearances unaltered, so I immediately put him on the use of mercury; and at the same time a repetition of the leeches round the meatus, and the application of blisters over the mastoid process, was had recourse to. As soon as the mouth became slightly affected, I observed that the vascularity of the right ear—that originally affected— was very much lessened, and I then recommended the application of leeches and blisters to that also; and had the satisfaction to find, that the hearing began to improve gradually on this as well as on the left side.

As Mr. S. improved daily the mercury was omitted, and he commenced the use of bark and hydriodate of potash. Towards the end of December he was so much improved that I discontinued my attendance, and I lost sight of him for a short time. In

the beginning of January, 1846, however, he again applied to me: worse than ever. The weather had been remarkably damp and unfavourable; he was much exposed to its influence, and had caught cold, which, to use his own expression, had "pitched in his ears." He was then so deaf that he could with great difficulty understand what was said to him, although addressed in a distinct and loud voice. The vascularity had returned in the left, and partially in the right ear, and the mucous engorgement of the tympanal cavities was more manifest. The same course had to be pursued as on the former occasion; he was confined to the house for a month, and kept under the gentle influence of mercury for the last three weeks of that time. I desired him to try occasionally to press the air into the drums, particularly when blowing the nose; and as the inflammatory condition subsided he was enabled to do this with greater facility. Each time theair passed, his hearing was improved. At the end of a month the mercury was discontinued and the leeching given up. Small blisters were kept open behind the ears, and the use of bark and hydriodate of potash was persisted in for some weeks longer. In the following November all trace of disease had been removed from the left ear, and the tympanal membrane of the right was much thinner, and much less vascular and opaque, than when I first saw him in 1845;—his hearing was perfect upon the left side, and increased on the right to fourteen inches. He has remained well from that time to the date of the publication of this work.

In the foregoing case we have a good example in the right ear,—which, when I first saw it, was in the condition of chronic inflammation,—of the effects of neglect, and also of the efficacy of the mercurial and antiphlogistic treatment, not only in the removal of recent disease, but in the improvement of an affection of several years' standing.

I could enumerate several other well-marked cases of this disease, were it necessary, all presenting the same appearances, and cured by the same means, but in very few has treatment been attended with the same happy results in an ear so long affected as in this. Generally only one ear is affected at a time, but sooner or later the other usually becomes engaged. I feel con-

vinced that many cases of incurable deafness have arisen from this disease.

In the treatment of the malady, the efficacy of tobacco-smoke should not be omitted. Where there is redness and relaxation of the mucous membrane of the throat and nose, with much "stuffing in the head," and mucous engorgement of the middle ear, the moderate use of tobacco-smoke inhaled from a *good* cigar, and gently puffed out through the nose, will be found beneficial. It certainly acts as a stimulant and astringent on the surface with which it comes in contact, and it is not improbable that some of it may find access to the cavitas tympani. I understand soldiers are in the habit of forcing tobacco-smoke into their ears when they become deaf. In strumous myringitis, and also in chronic or subacute inflammation of the lining of the tympanum, tobacco-smoke is often of service.

Syphilitic Myringitis.—Although practitioners who treat syphilitic diseases upon a large scale appear to be aware of the fact, that venereal occasionally causes deafness, I cannot find any authority which has noticed the disease I am about to describe. The deafness which sometimes accompanies the secondary form of syphilis is generally believed to be caused by inflammation and ulceration extending from the throat through the Eustachian trumpet into the middle ear; such may, under certain circumstances, no doubt, occur, and produce destructive inflammation and suppuration in this cavity, although I have never seen such a case myself, nor have I met with a well-authenticated instance of it recorded. The English writers upon aural diseases have altogether omitted syphilitic affections of the ear, as have also Kramer and most of the continental writers, with the exception of Lincke and Frank, the latter of whom enumerates two forms,—the first, external syphilitic otitis, in which secondary ulcerations occur in the auditory canal, accompanied by other well-determined symptoms of the disease; but these are already known to the surgeon, they resemble ulcerations on the margins of the tarsal cartilages, and are sometimes the consequences of rupia upon the auricle, in the vicinity of the meatus (see page 169). Under the head of otitis interna, he describes the result of lues, which, he

says, arises either as a reflex of the disease in the ear itself, or is propagated through the Eustachian tube from the throat. He says this disease is accompanied by great pain, and often terminates in suppuration of the middle ear, destruction of the tympanal membrane, and caries of the temporal bone. It is evident, however, from his description, that the disease of which he speaks is the ordinary suppuration of the cavity of the tympanum, with neglected otorrhœa, and in nowise characterized by any peculiar syphilitic symptom.

Lincke's usual accuracy and observation seem to have deserted him when writing his chapter upon "Otitis Syphilitica;" for, while the affection now under consideration seems totally to have escaped his observation, he has, with most laborious German assiduity, collected together a multiplicity of authorities bearing upon the subject of what are supposed to be syphilitic diseases of the ear, but not one of which he himself has verified. Thus he enumerates from the works of Cullerien and Plisson chancres both on the auricule and in the meatus. He also gives a description of chancres, "if they arise near or *on* the membrana tympani"! but, like Frank, his descriptions are chiefly in reference to the syphilitic otorrhœa, the result of inflammation and ulceration extending from the throat or nose, a disease, the existence of which yet remains to be proved by original observers, not system-makers or cyclopædia-compilers.

While Lincke's work must ever remain a most valuable book of reference, it is high time for those who wish to advance the science of aural surgery to cast off the incubus of authority, and by patient investigation and originality of observation to establish facts. Kramer deserves much more credit for omitting all notice of an affection which it is evident he had never himself observed, than those writers who, with equal want of knowledge, have endeavoured, by collecting out of a variety of obscure writers some ill-recorded cases, to establish an untenable theory.

In 1835, M. Lallemand, in his Clinical Lectures on Syphilitic Diseases, as reported by Dr. Waters, related four cases of syphilitic deafness cured by ante-venereals. (See Medical Times, for 27th September.) Were medical literature to be searched from end to

end, I do not think such instances of unwarranted assertion and loose writing could be found. The state of the membrana tympani was never inspected, nor the condition of the middle ear explained, in any one of these cases.

The disease which I am about to describe is an inflammation of a specific character, occurring in the membranes of the tympanal cavity, but chiefly exhibited in the external membrane of the drum. All the cases I have seen of this affection occurred in young men, and generally those of fair complexions and blue eyes, who had had primary sores upon the genitals from six to twelve months previously, which sores were of rather a deceptive character, so that mercury was seldom given in the first instance, at least in a legitimate form. These sores were usually tedious in healing, and followed by papular eruptions and sore throats, for which mercury was, in most of the cases, taken irregularly. Buboes were not a common attendant, nor had iritis ensued in any of the instances of well-marked venereal myringitis which fell under my notice; but, generally speaking, eruptions, copper-coloured blotches, fissures and ulcers of the tongue, with loss of strength, and slight nocturnal pains, existed previous to the aural affection, which should, I think, be ranked as a tertiary symptom. In almost every case which I have witnessed, the disease appeared suddenly, as an eruption was fading off; in two, it came on at a later period, and was accompanied by loss of hair; in most it appeared in the upper or middle ranks of life. In some cases there is at first a sensation of fulness in the head, and often vertigo upon stooping or rising up suddenly, and the patients have usually a feeling of fulness within the ear; but in no instance have I seen it accompanied by acute pain, in which circumstances it resembles the sub-acute form of inflammation already described, and is therefore placed as a subdivision of that species; but upon inspection, the amount of redness and vascularity will be found very much greater than the latter; and in this consists one of the chief characteristics of this disease, that while it is unaccompanied by local pain, as in the sub-acute inflammation, the membrana tympani will be found to present an amount of redness equal to, and sometimes exceeding, that seen in acute myringitis. The redness

has generally, however, a brownish hue in the syphilitic form, which is not observable in that just alluded to. There is not, at first, much loss of polish, but in a short time the membrane assumes a fuzzy appearance. The auricle and meatus I have not seen affected more than in the sub-acute form; both ears are usually attacked at the same time. The amount of deafness is always very great, and is the symptom that first attracts the patient's attention, and it seldom varies. Tinnitus is not usually present, but in two cases which I possess the notes of, the deafness was ushered in by a very loud noise, which passed away after a few days. This inflammation does not end in muco-purulent discharge from the tympanum, the surface of the membrana tympani, or the sides of the auditory canal; nor have I seen lymph effused upon the membrane, as in the more violent and painful forms of otitis; but from its brownish-red colour in the very early stage, from a yellowish speckled opacity, which is generally observable in it on the subsidence of the redness, and from the intense degree of thickening and dulness which were present in some cases, which were evidently the result of syphilitic disease, I am inclined to think that lymph is largely effused between the laminæ, or upon the inner surface of the membrana tympani. Two of the worst cases of non-congenital deafness I ever saw appeared to have been the result of syphilitic inflammation, and in both there was great thickening, opacity, and insensibility of the membrane. I am also inclined to think that syphilis has played a more extensive part in the production of deafness than the profession is aware of.

The following case of syphilitic inflammation of both tympanal membranes, with rapid recovery under mercurial treatment, is characteristic of the affection.

Mr. A. B., aged 30, had a doubtful-looking sore upon the penis, twelve months previous to my seeing him. Considerable doubt was expressed as to the genuine syphilitic character of the sore; but it healed under local treatment. Some months subsequently he had a bubo in the right groin, and a small abscess also formed on the under side of the urethra; he then rubbed in mercury, and was confined to the recumbent posture, until the swelling of the groin had completely subsided. After this he expe-

rienced great weakness and lassitude, and suffered for several weeks from sore throat. These symptoms were relieved by removal to the country; but on his return to town, an eruption appeared extensively on the genitals, thighs, and abdomen, and he had also some slight deafness. He was benefited by the use of hydriodate of potash; but the eruption came and went, both on its original seat and on the chest and extremities, during the next few weeks. I first saw him with Mr. John Evans, in the middle of October, 1847; he had then no sore throat, but a fresh crop of eruption, in the form of brownish spots interspersed with small pimples, had appeared generally over the back and the outer sides of the arms. He had also become exceedingly deaf, hearing the watch only when pressed against the auricle, and he complained of a sense of giddiness and fulness in the head, but had no pain whatever in the ears, nor any snuffling in the nose. He stated, that his deafness had occurred suddenly, a few hours after rising in the morning some days before; that he had tinnitus at the commencement, but that it had now nearly vanished. Upon inspection, the auditory canal was found dry, and the membrana tympani of an uniform dark brown-red colour, so that the situation of the hammer bone was not easily recognisable. There was no ulceration observable, nor any alteration in the plane of the membrane; but the light was not reflected from it in the ordinary manner, thus showing that it had lost its polish. These appearances were nearly the same upon both sides. He was able to inflate the drums perfectly, and auscultation afforded no evidence either of contraction of the audito-faucial passages, or of any accumulation of fluid within the tympana.

The treatment consisted in the application of leeches round the meatus every second day, and the use of calomel and opium in small and frequently repeated doses. This mode of administering the mineral disagreeing, we were obliged to discontinue it, and substitute inunction in its stead. The deafness and the appearance in the ear remained unaltered until the morning on which salivation was produced, and then hearing was restored almost miraculously, and the next day the redness and vascularity in the ears had almost disappeared. Gentle pytalism was kept up for

some days longer. He has not since had any return either of the deafness or other syphilitic symptoms.

I attended a case with Mr. Cusack some years ago, in which it was found necessary to keep up the mercurial action for above a fortnight, but in that instance the disease had been of much longer standing; I also treated a well-marked case in consultation with Mr. Mason, in which several relapses occurred, just as we often observe in syphilitic iritis.

Case No. 4 in the Registry presented syphilitic inflammation of the membrana tympani on both sides.

P. L., aged 30, a policeman, with fair complexion, light hair and eyes; has complained of deafness, unattended with pain, for one month; says he had a primary syphilitic sore about three months ago, and lately suffered from sore throat; has slight copper-coloured patches upon the skin of the forehead, but does not exhibit symptoms of any other eruption. He has ulceration of the soft palate, a deep excavation, with a yellowish ash-coloured slough coating its bottom, existing on each side of the uvula. He did not get mercury for the original sore. The deafness came on in both ears about the same period, and occurred during the daytime.

Left Ear.—Meatus dry, polished, of a grey colour, and totally devoid of cerumen. The tympanal membrane shows an exceedingly well-marked sub-acute inflammation; there is a pinkish hue, like that of a rose-leaf, all over it, but it still preserves its polish, and has not become collapsed or altered in shape: a tolerably well-marked crescentic opacity margins its inferior attachment. The patient can inflate the drum, and thereby render the vascularity of its external membrane more intense, and of a darker red; he has a singing noise in this ear, and only hears the watch when pressed against the auricle.

Right Ear.—Meatus paler, more polished and opaque than on the left side. The tympanal membrane is redder, and also somewhat collapsed, so that the malleus projects very prominently. Has an intermitting noise in character like that experienced when a conch-shell is held to the ear. Cannot fully inflate the drum on this side, but the effort to do so renders the membrane of a deeper colour. Cannot hear the watch on this side.

A pill of one grain of calomel, two of blue pill, and a quarter of a grain of opium, was ordered to be taken three times a day.

30th. In this case the mercury has acted fairly and legitimately, and we find that the disease for which it was administered has already given way. In the right ear the pinkish colour of the drum-head is very much lessened, the polish has been in part restored, and the patient says that the singing noise has greatly decreased. He now hears the watch when applied to the ear. Upon the left side all the symptoms have improved, and the hearing distance has increased about two inches. If we apply the watch to the ear and then draw it slowly from it, the deaf person will be able to catch the sound (the ear appearing to retain the impression of the ticking) at a somewhat greater distance than if we approached the watch to the ear.

The mercury was lessened to one pill night and morning, and directions were given to the patient to decrease it still further if the mouth became sorer. The ulcers upon the soft palate, which have assumed a more healthy aspect than before, were brushed over with a strong solution of nitrate of silver.

February 1st.—This patient is greatly improved in every respect; hearing increased on both sides. Upon the left, the tympanal membrane is much paler than at the time of the last examination, and the noise completely ceased in this ear upon the previous day, without the man being conscious of any crack or sudden sound at the time of its cessation. Upon the right side the membrane has improved in colour and gained more polish. The ulcers in the throat have thrown off their sloughs, and present a healthy appearance; the mercurial action upon the mouth is still manifest. The dose of the mineral to be decreased to one pill daily.

5th. A still further improvement has taken place since last report. Upon the right side the membrane is yet slightly pinkish; the hearing as before. Upon the left side the membrane has greatly improved, and is now nearly of a natural colour; hearing distance seven inches; throat healthy; mercurial action still manifest. Ordered four grains of hydriodate of potash and one drop of tincture of iodine, to be taken in decoction of bark three times daily.

9th. General health and appearance much improved. Mercurial action scarcely perceptible; but the gums are still slightly retracted beneath the lower incisors, and exhibit a red, pulpy margin. The ulceration of the throat has quite ceased, and the cavity upon the left side is nearly filled up. He says his hearing is completely restored, but the noise comes on occasionally in the right ear. Upon this side there is some secretion of cerumen upon the posterior surface of the meatus. The tympanal membrane is still slightly pinkish, but bright, thin, and polished, reflecting the light from its lower convex portion. He can inflate the tympanum with facility, and upon applying the stethoscope over the meatus, while the patient presses the air into the ear, a slight gurgling noise can be perceived as it reaches the cavity of the middle ear, which, in all probability, contains a quantity of mucus, exuded from its lining membrane during the inflammatory process, which, there can be little doubt, extended to it and to the lining of the Eustachian tube,—parts that we cannot see,—as well as the tympanal membrane, which we can see. On the left side: hearing distance ten inches; meatus still red, shining, and devoid of cerumen; tympanal membrane opaque, but thin and polished; a couple of large red vessels traverse along the insertion of the malleus. The air does not reach the cavity of the middle ear so well as upon the right, and it has a more squeeling sound, probably arising from the thickened membrane and the decreased caliber of the Eustachian tube. Ordered to continue the iodide of potassium, and to apply small blisters behind the ears occasionally for the next fortnight.

That *Gouty Otitis* may exist I have no doubt, but I myself have never seen a well-marked example of it; neither have I yet read a description of that disease which afforded any one pathognomic which could be relied upon. I have, at page 168, alluded to attacks of gout in the auricle: Dr. Graves, to whose authority I there referred, gives an instance of deafness attended with otorrhœa, in which the patient's hearing was always improved after a seizure of gout in the foot. Several continental authors mention gout as a cause of deafness and disease of the ear:—Dr. Vering of Vienna, in 1832; Lincke in 1840; and Frank in 1845; but they are chiefly compilers, whose writings on some points re-

mind one of the variety of counts introduced into an indictment in the hope that some one of them may convict the prisoner. Within the last few months a special work has appeared on the subject,—that referred to at pages 49 and 225; but I cannot discover in it the requisite information, as the symptoms of the different forms of gouty otitis therein detailed are common to every other form of aural inflammation. The author, Mr. Harvey, says that "furuncles form and burst in the *muscles** of the ears." Next follows otorrhœa, which, if of long duration, may produce polypous growths. In frequent relapses "varicose vessels become developed on the membrana tympani," and when the disease proves fatal from what may be termed cerebral otorrhœa, "all the canals are found to be filled with purulent matter, as well also the cells of the mastoid process, the bone itself being in a state of caries." Now, when gout seizes upon the eye, it chiefly affects the sclerotic and the iris, and I would expect from analogy that where it was seated in the ear, its manifestation would be in the fibrous layer of the membrana tympani, in the form of acute myringitis, like that seen in rheumatic cases.

Some time ago Mr. Toynbee published a small tract, with the attractive title of "The Pathology and Treatment of *the Deafness attendant upon old Age*," in which the author successfully combats the conclusion to which medical men have arrived, that deafness "depends upon a gradual and natural decay of the powers of the organ of hearing, and that it must in consequence be endured as a disease entirely beyond human control." And the result of the author's experience tends to show that the decline of audition "is dependent upon the influences to which aged persons are frequently subjected: namely, the prolonged stay in warm rooms, the avoidance of the open air, the cessation from bodily exercise, the want of attention to diet, and to the healthy performance of the functions of the skin." In support of this view, Mr. Toynbee has given the dissection of eighteen cases, a portion of those already enumerated at page 110; and the results obtained were thickening of the mucous lining of the tympanic cavity, and also

* German writers often style the auricle the *ohrmuschel*, from its likeness to a muscle-shell or conch.

of the membrana tympani, with the existence of bands of adhesion connecting together the various parts contained within the former. These evidences of previous inflammation are, however, but what might be expected in the post-mortem examination of any of the mucous or serous cavities in aged persons, and the condition of the ears in those dissections is similar to what the same author has shown is the chief cause of deafness in persons at any period of life.

STRUMOUS MYRINGITIS.

I have had some difficulty in determining whether to place the following disease among the affections of the cavity of the tympanum or the membrana tympani, for, its seat being in the mucous layer of the latter structure, it is manifest that it must, sooner or later, spread over the whole cavitas tympani, and is consequently common to both. As, however, the visible signs of the disease are most apparent on the membrana tympani, I have classed it along with the affections of that part.

This is a frequent affection in young persons, and, I believe, a very constant cause of deafness in after life. Its subjects are usually from five to fifteen or sixteen years of age, but it may appear at a much later period. It chiefly attacks the light-haired, fair-skinned, blue-eyed, and those who exhibit well-marked evidences of a scrofulous constitution. Its first symptom is that of deafness, generally attributed to inattention: scarcely a fortnight passes that I do not see a boy or a girl, from ten to fifteen years of age, from some of the public schools, who, having been deaf for two or three months previous, had been constantly reprimanded for inattention. If the relations are asked why they did not take advice for the child before, the general answer is, "We thought it was only a cold, and would not signify."

The auditory passage is usually dry, but seldom red. The tympanal membrane will be found of an uniform pinkish hue, but without either thickening or opacity, at least in the early stages. This colour, which is somewhat the tint of pink blotting-paper, appears to be seated in the mucous layer, and shines through the other laminæ of the membrane, which still preserve their polish

and transparency. There is generally mucous engorgement of the cavity of the tympanum, with thickening and increased redness of the faucial mucous membrane,—a condition which, there can be little doubt, extends through the lining of the Eustachian tube into the middle ear. It is, generally speaking, a painless disease, and but seldom accompanied by tinnitus in the first instance; occasional crackling sensations, gurglings, and loud reports, are felt in the ear, and sometimes temporary relief is experienced therefrom. Catarrh, stuffing in the nose and frontal sinus, and great liability to "cold in the head," are not unusual symptoms, or rather attendants; there is no pain on pressure in or about the ear, the throat, the mouth, or the Eustachian tube. Strumous affections of the eyes are not an unfrequent complication, and these, particularly corneitis, which it very much resembles, and also strumous ophthalmia, sometimes alternate with the affections of the ear, as shall be further explained in this chapter. Enlargement of the tonsils is a very frequent accompaniment; and glandular swellings about the neck not an uncommon appearance in such cases. The amount of deafness varies from a hearing distance of eight or ten inches to total inability to hear a watch applied to any part of the head, or held between the teeth, or even to hear what is said in a loud and distinct voice; and, generally speaking, the amount of redness and vascularity presented in the membrane of the drum is in the ratio of the amount of deafness; but the latter is very variable, and would, in many instances, appear to be influenced by the state of the atmosphere,—being greatest in damp, moist weather. In some cases the redness assumes a dark, damask-rose colour, and then we may generally rest satisfied that the entire of the middle ear is engaged. Simple mucous discharge occurs occasionally, and purulent otorrhœa succeeds in the more aggravated cases, as the disease advances, but it need not present at any period of the affection. The constitution is generally below the standard of health; the patient is usually pale, languid, and inactive, with, perhaps, slight loss of appetite, and some dryness of the skin.

This form of myringitis is very liable both to relapses and returns, and of this latter circumstance the patient or the friends

should be always informed. When once a child has had this complaint, the slightest exposure to cold may re-induce it.

The treatment in this disease should be chiefly directed to improve the condition of the constitution, and I know nothing better for effecting this object than the use of bark in its various preparations, conjoined with iodide or bromide of potassium, and, when the inflammation is of a more active character, the bichloride of mercury. In the advanced stages, and where there is much constitutional taint evident, with enlargement of the cervical glands, &c., the oleum jecoris will be found most effectual; but whichever of these may be employed, it should be steadily persisted in for a length of time. This is a slow and tedious disease, lasting, even in the most favourable cases, for months, and being liable to relapse, patients should be carefully watched, and their ears examined at least once a week, while any trace of inflammation remains. A dry, pure, country air, and a residence by the sea-shore in summer, will always be found beneficial; but, as far as my experience extends, I have always found bathing in the open sea injurious. The warm bath occasionally, appears to be of use. As in cases of strumous ophthalmia, so in scrofulous myringitis, a leech or two may sometimes be required, although depletion is not generally indicated.

As the tongue is usually white and clammy, and the dejections often vitiated, small doses of chalk and mercury, combined with rhubarb and columba, given as alteratives every second or third night, will assist our other means. The diet should be light and highly nutritious, while all acid fruits, pickles, and ill-boiled or stale vegetables, even made dishes and pastry, should be avoided. Constant open air exercise during the fine part of the day is very necessary; and when the weather is at all harsh, cold, or damp, a light covering should be worn over the ears, or small bits of cotton laid in the conchæ; but in the house, or in warm weather, these precautions are unnecessary; neither do I believe it at all efficacious to keep the head warmer than under ordinary circumstances.

Counter-irritation will be found most effectual, and the vesicating liniments more efficacious than the ordinary blistering.

The strong tincture of iodine, acetum lyttæ, or croton oil and acetic acid conjoined with spirit of turpentine oil of rosemary and soap liniment, form very useful applications. This latter liniment should be rubbed over the mastoid process, and lower down, as far as the angle of the jaw, once or twice a day, until a slight vesicular rash is produced, when its use ought to be discontinued until the redness has disappeared, when it may be re-applied as before. This irritation should be kept up for a couple of months at least, varying the application as the parts become accustomed to any particular substance. Whatever is used, great care should be taken that it does not spread over the back of the auricle, which is very likely to become inflamed and greatly swollen by it.

This is one of the diseases in which catheterism of the Eustachian tube is sometimes necessary, but, I believe, not so often as is generally resorted to. When the patient himself can readily pass a stream of air into the drum, by making a forced expiration, whilst we apply our ear, or a stethoscope, to his external ear, so that we can distinctly perceive the full and natural inflation of the membrane, the introduction of a catheter, and the pressure of a stream of cold air, I believe to be not only unnecessary, but injurious. In cases, however, where mucus has collected in the cavitas tympani, catheterism may be resorted to occasionally, and even warm water, or some bland fluid, might be thrown up by means of a syringe, although I have my doubts as to the quantity of any fluid which can be thus driven into the tympanum, in order to wash out mucus, pus, blood, or other extraneous substances. As I do not believe that the enlarged tonsils which often accompany this disease—as they do other strumous affections—are the *cause* of the deafness and the inflammation manifest in the drum and its membranes, I cannot recommend their removal, as has been proposed, and acted on by others; but the application of a strong solution of nitrate of silver to the back of the throat and fauces, and particularly towards the mouth of the Eustachian tube, by means of a piece of lint attached to the end of an aneurism needle, and applied as far up as possible behind the pillars of the soft palate, will be attended with beneficial results; and the use of astringent gargles should be persevered in during the continuance of

the throat affection. If otorrhœa ensues, is to be treated as I have recommended in the chapter upon that subject.

No. 12 in the Registry is a case of sub-acute strumous myringitis.

M. M., aged 16, a male.—It is quite manifest, from the way in which he speaks, that this boy has been deaf a long time. His utterance is indistinct; there is a sort of whistling sound in his speech, as if he sipped in the air, and then blew it out through his nose; his voice is hoarse and insonorous, and he labours under that peculiarity denominated, though incorrectly, speaking through the nose; the tonsils are not enlarged; the throat is normal, with the exception of a slight elongation of the uvula, but which is quite insufficient to account for the peculiarity of his speech; and the nose, as far as we can ascertain, does not exhibit any congenital peculiarity or acquired disease. This boy says he has been deaf since childhood; in fact, he never remembers hearing well; he has had occasional slight pains in both ears, but they never amounted to any degree of intensity; never had a discharge from either ear, but suffers from noise in the left. His amount of hearing varies considerably from time to time, and is much decreased whenever he catches cold.

Right side.—Hearing distance three inches. Auricle and meatus normal; tympanal membrane white, thickened, opaque, and slightly collapsed, or pressed inwards from its natural curvature; its lower edge vascular. He cannot inflate his drum; but the attempt to do so increases the inferior vascular crescent, and causes several large red vessels to appear upon the upper half of the membrane.

Left side.—Only hears on touching. Membrana tympani exhibits a uniform pinkish colour, somewhat resembling the hue of a rose-leaf; the thickening and deposit has not yet taken place. To introduce an instrument into the Eustachian tube, and force fluid or gaseous bodies into the middle ear, would, I believe, in all such cases, be of little avail until we subdue the local inflammation, and correct the constitutional tendency to its return. The treatment consisted in slight local depletion frequently repeated, long-continued counter-irritation over the mastoid process, and the

exhibition of such internal remedies as we know by experience, from the diseases of analogous organs, improve the constitution, and tend to correct the tendency to disorganizing inflammation, such as the oxymuriate of mercury and bark, the preparations of iodine and potassium, cod-liver oil, &c.

OTITIS IN CONNEXION WITH OPHTHALMIA.

The following cases are typical of a form of strumous inflammation of the ear with which I have been long familiar. It sometimes co-exists with, sometimes alternates with, the ocular disease. What is termed strumous ophthalmia, and also corneitis, are the forms which the eye affection assumes. Occasionally it is that of choroido-iritis. We often see the patient labouring under the disease of the eye in the spring and early summer, and that of the ear in autumn and winter. Both seem to be contingent on the same constitutional diathesis, but the aural affection being generally painless, and the part in which it is seated being concealed from view, it attracts little attention, or it is attributed to stupidity. Unhappily, in these cases the mischief has been done: the thickening and deposit in the membrana tympani have already taken place; the inflammatory action has subsided; we now only witness its results, and treatment will avail but little. Improvement of the constitutional health, and placing the patient in the most advantageous circumstances, may possibly in time produce so much absorption as will give a moderate increase of hearing. I suppose these cases belong to that class which medical practitioners, not examining with the speculum, and, consequently, not knowing what is going forward, were heretofore in the habit of telling patients or their friends "to let alone, and in time they would grow out of it." If we look into the statistics of deaf-dumbness for different countries in Europe and America—and the same remark holds good with respect to the investigations instituted in Ireland on the same subject—we shall find, among the causes of acquired muteism, "diseases of the eyes" frequently recorded. Now, as we cannot suppose that diseases of the organs of vision could of themselves produce total deafness, leading to complete loss of speech, we are forced to the conclusion, that with the ophthalmic disease

co-existed some insidious aural affection such as I have described, and so intense as to produce deafness, and, in very young persons, consequent loss of speech. It generally occurs at from five to fifteen years of age; but, whether it is owing to metastasis of the morbid action from the eye to the ear, or the same strumous diathesis inducing the affection in the tympanum, I cannot say.

No. 26 in Registry.—H. M., a female, aged 16, with hazel eyes, yellowish hair, large projecting mouth, freckled skin, glandular swellings of the neck, and other manifestations of struma; has been deaf for several weeks. There is an opacity of the cornea on both sides, arising from ophthalmia, for which she was treated at the Institution some years ago. She had also strabismus of the left eye, for which she was successfully operated on at twelve years of age. Left side.—Hearing distance four inches; membrana tympani opaque, densely white, and collapsed, a few red vessels course along the handle of the malleus; tinnitus. Right side.—Hearing distance two inches; membrana tympani opaque, and of a skim-milk colour; tinnitus. She never suffered from pain; never had any discharge from either ear; throat natural; tonsils not enlarged. Ordered cod-liver oil, and to have the mastoid region painted with strong tincture of iodine daily.

No. 27 in Registry.—A. S., a female aged 12, with dark auburn hair, fair complexion, and hazel eyes, suffered from pain, redness, and intolerance of light in both eyes some years ago; traces of the affection still exist in the nebulous condition of both corneæ, and she bears the marks of glandular enlargement; has been deaf five years; disease came on with pain and slight discharge from both ears; the discharge has ceased for some time. Right side.—Meatus natural; membrana tympani thickened, opaque, and of a brownish colour, presenting the appearance of crumpled parchment; hearing distance scarcely half an inch. Left side.—Membrana tympani devoid of polish, and of a brownish-red hue, with a crescent-shaped vascularity at its inferior edge; the disease on this side is evidently of a more recent date; hearing distance one inch. She states that her hearing is always better in the spring and summer, when the eyes are usually affected. Ordered oxymuriate of mercury, with bark and counter-irritation behind the ears.

Master B., aged ten years and a half, consulted me during the past month on account of deafness, so complete as to require the use of writing in communicating with him. He is of a strumous family, several members of which have been deaf. He had a brother who lived to four years of age, but never exhibited consciousness, seldom moved, never spoke, did not appear to hear, scarcely to see, and was to all appearance idiotic. Master B. had convulsions at three months old, and again when three years of age; he, however, grew up to be a stout, healthy boy, intelligent, and with all his faculties perfect. He is well made, has blue eyes, and rather light hair. In June, 1851, he was attacked with severe ophthalmia, which lasted about six weeks, in the left eye. The disease was painless, but caused intolerance of light, and was characterized by redness of the globe, lachrymation, and great indistinctness of vision. He was then seized with hooping cough, and after the interval of a month the right eye became affected similarly to that on the left side. During the winter his eyes got well, with the exception of an opacity on the right cornea; and in spring it was remarked that his hearing had become defective, and gradually lessened up to November last, when it failed altogether. He cannot hear at all, even by shouting into his left ear; but, when his mother speaks to him, by holding her mouth to the right auricle, he is able to distinguish what is said. His voice is beginning to be affected; it has lost its intonation, has become nasal, and with that sipping character—as if drawn in through the closed teeth—characteristic of total deafness, which I have described at page 81. He is not conscious of the ordinary street noises; he does not complain of tinnitus. Within the last two months he has become very nervous, starting up in his sleep without any apparent cause, especially if he awakes and does not find a light in his room,—although this does not seem to arise from the usual feeling which some children have on that subject. Latterly some unsteadiness of gait has been remarked; and there is a more than usually frequent desire to urinate, especially after lying down.

The auricles are normal, as also the external apertures of his ears, although the latter are dry and devoid of cerumen. The

membranæ tympanorum nearly the same on both sides; are very much altered from the natural character; have lost their transparency, polish, and curvature, being now white, thickened, opaque, and slightly collapsed. There is still some vascularity around the tubercle and handle of the malleus, the result of previous inflammation, with lymphy deposit in the membrane. All that can be learned of the state of the cavitas tympani is, that it is unsusceptible of inflation upon the right side, and scarcely admits any air upon the left; but that the inflammatory action, which has left such manifest traces in the external membrane, must have extended over the tympanum, and possibly into the labyrinth, there can be little doubt. From this boy's hereditary tendency, his slight irregularity of gait, the nervous startings at night—so common to partially deaf people—and the tendency to frequent action of the bladder, it is not unlikely that his brain and spinal marrow may be engaged, though in what manner it is difficult to determine. The prognosis is not favourable to a recovery of hearing, yet it is not altogether hopeless, and the constitutional symptoms may possibly be grown out of. The treatment recommended consisted in long-continued counter-irritation behind the ears and round the nape of the neck, with the use of iodine in minute doses, taken in the form of a mineral water.

In cases of this nature, the patient should be encouraged to speak as much as possible, and on no account allowed to employ signs or finger-writing. He should be spoken to in a clear, distinct tone of voice, not too loud, and the mouth removed from his ear gradually day by day, so as, if possible, to educate the sense and increase the hearing distance; he should also be made to read aloud every day. The company of persons of his own age will be advisable, provided they are not allowed to resort to signs in communicating with him; and his mind should be engaged with some pleasing, healthful occupation.

The further treatment—medical, moral, and educational—of the partially deaf, either congenital or acquired, will be considered in the chapter upon Deaf-dumbness.

TYPHOID AND EXANTHEMATOUS INFLAMMATIONS OF THE MEMBRANA TYMPANI.

In the *otitis accompanying scarlatina, measles, and small-pox*, I believe, as I have already stated, that the disease either commences in the mucous lining of the middle ear, or spreads into that cavity from the mouth and fauces through the Eustachian tube. Sooner or later, however, the membrana tympani becomes engaged, and is ruptured either by ulceration or from the pressure of the contents of the tympanum, and otorrhœa, with its long and varied train of consequences, ensues. This form of inflammation is therefore considered under the head of diseases of the cavitas tympani. Moreover, I am not at present able to state from personal knowledge what are the peculiarities of the inflammation which precedes the discharge in those cases; as, although of very common occurrence, the practitioner in aural surgery does not in general see them till long after their first appearance,—seldom, indeed, till the disease becomes chronic, and complicated with polypus; or often not till long after ulceration has destroyed the membrane, the ossicula have been discharged, and other irreparable mischief has occurred. During the severe epidemic of influenza in 1847, I had some opportunities of examining the membrane in the early stage of that affection, and I found it dark-red, thickened, and even pulpy, like a highly injected portion of the intestinal mucous membrane; I also observed in such cases an increased and apparently acute cerumenous secretion coating the passage.

The *deafness attending typhus fever* is a well-known symptom, although its true pathology has not been yet elucidated, because a sufficient number of autopsies have not been made; and we have not well-authenticated descriptions of the appearances which the parts susceptible of inspection during life present. In this country, where extensive opportunities for studying typhus exist, the deafness which occurs during the progress of fever is generally regarded as a favourable symptom; but I believe that that which arises in the commencement is not so favourable. I can only speak as to the results. In a few instances the membrana tympani was perfectly natural, and the tympanic cavity free; and the patients presenting such generally had a bad form of fever,

with very severe head symptoms. Such cases I suppose to be analogous to the amaurosis which sometimes arises during the progress of fever, and often remains permanently, being a cerebral, and not an ocular, disease. But in the great majority of instances the membrana tympani presented evidences of disease, being generally thickened, opaque, and collapsed; I am, therefore, led to believe that, in very many cases, the deafness occurring during the course of a fever is the result of inflammatory action in the ear itself, and not in the brain. In this opinion I am borne out by the dissections of M. Passavant, who says, that in "patients cut off by typhus fever,"—and he has always found certain pathological lesions corresponding to the symptoms observed during life,—"the petrous portion of the temporal bone is congested, and the congestion extends to the internal parts, except those of most solidity. The transparency of the tympanum has disappeared; the membrane is thickened, red, and its epithelium peels off with great readiness. This injection of the membrana tympani extends some way along the external auditory canal, and in some cases small spots of ecchymosis are found between the injected vessels. The cavity of the tympanum contains a thick, viscid mucus, which is also found in the Eustachian tube, and in the cells of the mastoid process. The mucous lining of the middle ear is congested likewise, of a rose or bluish-red colour. The labyrinth does not present any constant alteration, though some points of injection are occasionally observed."* I have observed that suppurative otitis is not common in typhus, while it is the chief characteristic in the disease occurring during the progress of scarlatina or measles, where the membrana tympani is almost invariably perforated, and a bad form of otorrhœa results. I think it, therefore, more likely that, when local disease is set up,—and from the organic changes subsequently observed, there can be no doubt of the fact,—the inflammation is seated in the fibrous structures, and not the mucous lining of the ear. Typhus occurring in children is a cause of acquired muteism, for which see the following chapter, and also that on Deaf-dumbness.

* Zeitschrift für Rationalle Medizin, quoted in The Medical Times for April 19th, 1851. For further information see the sections on Otitis and Acquired Muteism.

CHRONIC MYRINGITIS.

Chronic inflammation of the membrana tympani is a very frequent cause of deafness, as may be seen by referring to the Table at page 102: no less than 396 cases out of 2385, or one in every six, having presented at the hospital in the period specified. To these might be added the 219 cases of thickening and opacity of the membrane, but that, in a practical and a therapeutic point of view, there is a manifest difference: the former being frequently within the pale of art, whereas the latter, if of long standing, is generally irremedial, and it is more frequently accompanied with collapse. In chronic myringitis there is generally some evidences of inflammatory action going forward. Whatever may be the original cause of the disease, it is one that comes under our notice daily; and, although many cases present as such in the beginning of the deafness, the appearances of chronic inflammation of the drum are to be found as the sequelæ of nearly all the other forms of inflammation, in the same way that we find chronic ophthalmia so frequently a sequence of the various acute forms of inflammation of the eye. In external otorrhœa the membrana tympani is generally in this condition; but there are two other special forms of chronic inflammation which may be constantly observed,—the first, a perfectly painless deafness; the other attended by paroxysms of pain, coming on at intervals, between which the patient is perfectly free from all uneasiness. The latter is much more common among females from twenty to forty, and is at times accompanied by irregularities of the uterine functions. The appearance of the membrana tympani is too peculiar to be mistaken: it presents a general thickening and opacity, particularly of its lower portion; besides which there is almost invariably a number of spots, about the size of pin-heads, of greater density than the rest, and of a pearly lustre, studded over the surface of the membrane. In many cases it presents the appearance of crumpled parchment. During the quiescent periods, we only remark a few straggling vessels, carrying red blood, spread over the surface of the membrane, and, for the most part, coursing from above downwards, parallel with the handle of the hammer. Upon

any provocation, however, such as cold, or other exciting causes, the membrane will, in a few hours, and often without any increase of pain, become of an uniform dark-red colour, precisely like *pannus* of the cornea, a disease of which it is the manifest analogue. The greater the amount of thickening and opacity, the less will be the quantity of vascularity and redness which the membrane is capable of assuming, as we perceive in cases of dense opacity of the cornea, owing, no doubt, to the greater quantity of deposit obstructing the flow of red blood, by diminishing, and, perhaps, also obliterating, the caliber of the vessels. In such cases the membrane is often insensible.

I have frequently seen a thin, skim-milk-coloured scale on the membrana tympani, like that which mineral lotions, lead, or alum occasionally leave on the cornea, with a number of fine radiating clear lines interspersed through it, as if the deposit had cracked in these places.

Cases of this kind are often of many years' standing, and many have, I am convinced, been treated as instances of "nervous deafness." The following is no imaginary case, but one of constant occurrence.

A lady, aged between 30 and 40, applies for advice. She is very deaf, speaks in a loud, inharmonious voice, and has suffered from noise in her ears, of all descriptions, for several years. She usually prefaces the detail of her symptoms (which is generally very long and verbose) by stating that she does not think much can be done for her, for that she is labouring under *nervous deafness*, and is, therefore, incurable. She has a great objection either to be questioned or to have her ears examined until she has made a full statement of her case; and as she has had a great variety of opinions, and has used all manner of remedies, she is tediously accurate in her account. She also carries in her hand a formidable list of questions. She states that she has been deaf from a very early period; that at first her deafness was attributed to inattention, and endeavoured to be remedied by the means thought most advisable by her guardians and governesses, and the family doctor; that, her disease increasing, she was brought to an eminent practitioner, who, after a few casual inquiries, but without examining

her ears, told her friends not to mind it, for that she would certainly "grow out of it" as she grew up, and that probably all her deafness would disappear about the period of puberty; but that she might rub *eau de Cologne* on the jaw occasionally! With the exception of sea-bathing, and means calculated to improve the state of her general health, no other remedies were tried, and no other advice sought for two or three years; when, not finding the hearing improved, but gradually becoming worse, and the tinnitus increasing as she grew up, a special aurist was consulted, who stated the disease to be entirely local, and curable by local remedies alone. During the next few years, various means were had recourse to: catheterism of the Eustachian tube was employed for several months, the tympanum constantly washed out, and various liquids and gases injected into it, but without effect. Counter-irritation was next employed, with issues in the arm and setons in the neck, and a long and fair trial given to their powers. It was next proposed to remove the tonsils, or, at least, portions of them. Still the disease progressed. Drops, oils,—eel-oil in particular,—and divers liniments were tried in vain.

Broken down in health, wearied by the variety of opinions and the multiplicity of applications, another eminent physician was then consulted, who, having heard the history of the case, advised the cessation of all local remedies, and recommended tonics and antispasmodics, together with shower-baths, change of air, and sea-bathing: stating at the same time that the disease was entirely constitutional, and of a *nervous* character. And certainly by this time, from hope deferred,—for many specious promises of cure had been made,—from the increase of the tinnitus, and from the effects of the long and severe treatment, the patient had become remarkably nervous and irritable, brooding over her malady, and rendered unhappy and discontented by being unable to take part in any general conversation.

Some years now passed without her doing anything; she had not become much worse, but she certainly had not improved. Owing to some new theory being started, at the solicitation of friends who had been relieved of some curable form of deafness, or from the celebrity of some particular practitioner, she was again induced

to seek relief; and having arrived at the metropolis, she took the round of the doctors and aurists. Some proposed perforation of the drum, others recommended travel; the honest prescribed nothing; the quack proffered his panacea, or offered to sell his peculiar acoustic instrument, and backed the recommendation of its merits by the sign-manual of persons of rank and position.* The homœopathists, hydropathists, and mesmerists, were each consulted, and the merits of their systems tested; heavy wet without, and infinitesimal nothings within, got every fair play; and a lock of the lady's hair was sent to Paris, to a celebrated practitioner in electro-biology; the Spas of England and the Badens of Germany were visited, and their efficacies tried; electricity, galvanism, and electro-magnetism, were also had recourse to, but all in vain. The opinions of those whom she had consulted were as various as the remedies they employed: but the greater number believed it to be a constitutional or nervous affection. Latterly she had been content to look out for "cures" among the newspaper advertisements, and of these she possessed a large number in her portfolio.

Of several such cases, scarcely differing in a shade, I possess the notes. In these the following may be gleaned upon a careful examination. The membrana tympani is thickened, opaque, slightly vascular, and sometimes much collapsed or drawn inward towards the inner wall of the tympanum, so that the handle of the hammer forms a manifest projection: it has also lost its polish and become of a dull pearl-colour. On questioning the patient closely, it is acknowledged that attacks of *ear-ache* were suffered several years previously, particularly in winter, and that such attacks were often preceded or accompanied by stuffing in the nose, and symptoms of catarrh, and were generally induced by cold, to avoid which the head was usually kept warmly muffled during such seasons.

In such a case our art at present does not offer much hope. The whole train of symptoms are evidently the result of slow chronic inflammation, affecting, in all probability, the lining of

* In a window in the Strand, not far from Somerset House, London, may be seen, framed and glazed, a certificate from one of the Chief Justices of England, lauding and recommending, "to all whom it may concern," a particular form of ear trumpet!

the cavity, as well as the membrane of the drum, like repeated attacks of choroido-iritis in the eye. The only means which can with safety be recommended at this period is the application of a solution of lunar caustic, applied with a camel's hair brush, every third or fourth day, upon the surface of the opaque membrane, while it is fully exposed to view, and should there be much vascularity present, the application of a few leeches as far in as possible round the meatus, at least twice a week. In a few cases the arnica will assist to remove the tinnitus; but it is not so efficacious in this as in more recent forms of the affection.

In the cases of periodic pain, with a higher degree and more generally diffused vascularity, the application of leeches, applied every second or third day, will be found most efficacious; at the same time that the patient should be brought under the gentle influence of mercury, and kept so for at least a month. Under such treatment, if the case is not of too long standing, the hearing will often be improved, and the symptoms of pain and tinnitus removed. The membrane will clear somewhat, but in most cases the spots of opacity remain indelible. In applying the solution of nitrate of silver with a fine brush, or a bit of cotton-wool on the end of a probe, some caution and dexterity are required, as the membrane may present a small perforation the next day if it has been rubbed too hard; and although I have always seen such perforations heal readily, it is an accident which should be avoided. By this application dark scales peel off the surface of the membrane, and leave it thinner and more transparent than before; but the moment it becomes inflamed we must desist. I knew two instances in which the tinnitus was always relieved for several hours or even a day after simply rubbing the surface of the membrana tympani with a bit of moist cotton.

There is a form of deafness with which I have been long familiar, which may be the result of some form of inflammation. In such cases, upon bringing the external membrane of the drum into view, we do not observe any general thickening or opacity of it, or any apparent alteration of its texture, but a crescent-shaped opacity, about a line broad and three lines long, with a tolera-

bly defined edge, and rather rough upon its surface, occupies the lower and usually the back portion of the membrane. It is generally more insensible than the rest of the membrane, and differs from the ordinary opacity, in the surrounding structure being apparently free from disease, in its almost invariable seat, its well-defined edge, and in its having a portion of unaffected membrane between it and the bony attachment of the membrana tympani. By a very slow and gradual process this disease spreads over the greater portion of the membrane, and produces permanent deafness. I am not aware of any remedy for it.

In some instances I have observed a manifest granular state of the membrane, not unlike the surface of a half-ripe raspberry, the intervening portions between the reddish elevations being thickened and opaque; it is unattended by discharge. In these cases I have procured an uniform thinning and clearing of the membrane, by the occasional application of a fine point of nitrate of silver; but this requires very great care, and should be persevered in for a great length of time, at least two months; it should, if possible, be applied so lightly as not to induce a discharge. Many of those cases are the result of long-continued otorrhœa, but which, having healed, has left the membrane in this condition.

Many females have become deaf immediately after parturition. In such cases I have generally observed a speckled opacity of the membrane.

No. 9 in the Registry is a case of thickening and opacity of the membrana tympani.

A. H., a female, aged 30: complains of deafness, tinnitus aurium, and constant pain in her right ear, and partially in the left. General health impaired, she says, on account of her aural affection; the almost incessant hammering noise, and the pain—aggravated whenever she gets cold—rendering her very miserable and nervous. The membrana tympani upon the right side is of a pearl colour, and evidently thickened by some interstitial deposit; it has lost its polish, but retains its natural position, and the patient can press it outward by inflating the drum. Posteriorly, there is a well-defined streak of dense white opacity proceeding downwards and

outwards from the point of the malleus. Hearing distance three inches. Left side nearly natural; hearing distance twelve inches. Scarely ever feels any pain unless when much exposed to cold.

MORBID DEPOSITS IN THE MEMBRANA TYMPANI.

Thickening and opacity of the membrana tympani, with or without flattening, collapse, or drawing inwards towards the cavity of the tympanum, is the most frequent apparent result of each and all of the foregoing varieties of inflammation in that structure. If we examine into the sequelæ of ophthalmic inflammation, we find that opacity either of the cornea or lens is, in a great majority of those instances in which the organ has not been totally destroyed, the chief cause of loss of vision. Lymph effused upon either side of the membrana tympani or between its laminæ is the manifest consequence of most inflammations, in addition to which the external cuticular layer may be thickened from pressure, as already explained at page 188, or by extension of cutaneous diseases, as shown at page 198; and within, the increased vascularity and hypertrophy of the mucous lining of the tympanic cavity over the posterior surface of the membrana tympani naturally gives rise to permanent thickening of this structure. An examination of the Registry of 200 cases in the previous part of this work, and the analysis of that Registry, at page 136, will explain the various conditions of the membrane to which I have so frequently alluded. It is possible that in those cases where we observe clear, pocket-like projections in the surrounding opaque membrane, that either from rupture, ulcer, or an outspreading of the fibres of the true central laminæ, that there is a partial deficiency of the membrane at these spots; but we require minute pathological investigation to determine which particular structure is deficient. It is, however, very probable that these projections are formed by the mucous membrane bulging through, and the dermoid layer being pressed outwards, like what takes place in a sacculated bladder, occasionally in the iris, and often in the cornea.

Atheromatous or calcareous deposits form between the laminæ of the membrana tympani, and generally occur in middle-aged females. The deposit is usually seated in the anterior vibrating

portion, is of a yellowish colour, and has a sharp, well-defined but irregular edge, totally different from that of a lymphy exudation, which generally shades off into the surrounding membrane. If scratched with a cataract needle, it will be found gritty, but what its exact composition is I cannot tell. I believe I was the first to notice this peculiar appearance, ten years ago, in my essay upon Otorrhœa, where I then stated, at page 38, "I have in three instances seen earthy deposits between the layers of the membrane like those which are found in the heart and arteries and cornea; they were regular in shape, occupied about one half of the tense portion of the membrane, and afforded a gritty feel when touched with a sharp instrument. In each case, severe deafness existed in that ear. In one of these cases, that of Lady B., I pointed out this peculiar morbid deposit to Sir H. Marsh, about eight months ago" (1843). Four such cases are noticed in the Registry (see page 137), and I have also seen several others in private practice. Sensibility remains in these. I believe the disease to be incurable.

Thickening and opacity of the membrane is as difficult of cure as the same appearance in the cornea. Much must depend upon the age of the patient, who may outgrow it; upon the state of the general health, from the removal of the opacity, being a process of absorption; and also upon the length of time which has elapsed since the original inflammation existed. The diagnosis should always be guarded: if redness and vascularity still linger about the membrana tympani and external meatus, we may entertain a hope of improving the patient's condition by the means pointed out for treating chronic inflammation in the foregoing section, and the employment of such constitutional and dietetic measures as serve to correct or alter the exciting cause. But if the patient has passed thirty years of age; if all vascularity has been removed; if the meatus is dry, scaly, and totally devoid of cerumen, and that the membrana tympani presents upon its external surface a uniform sheet of pearlaceous whiteness, with perhaps one or two superficial red vessels coursing along the malleus, treatment does not hold out a hopeful chance of success. We see enough of manifest disease to account for the deafness, but we cannot tell in

what condition the membrane lining the tympanic cavity may be; what amount of opacity and thickening may have taken place in the membrane of the fenestra rotunda; whether anchylosis of the stapes to the fenestra ovalis exists; or whether bands of adhesion have formed between the membrana tympani or the ossicula and neighbouring parts. Even supposing that none of these pathological changes have happened, and that the disease simply consists in an opacity of the membrana tympani, and that the patient is in good health, and absorption going forward, a year and more must occur before we can expect the membrane to clear, either in whole or in part, and few persons will be found with sufficient confidence and patience to carry out the prescribed treatment; yet I have sometimes been astonished at the favourable turn which some of the most unpromising cases have taken, in the instance of persons who, like the woman in Scripture, prevailed through their importunity, even after I had given a most unfavourable prognosis.

The treatment, like that of chronic inflammation, consists in painting over the surface of the membrane with a solution of nitrite of silver, of from ten to twenty grains to the ounce, about twice a week. A camel's hair pencil is not so good a means of applying it as a bit of cotton-wool twisted round the end of a probe, as it should not merely be applied, but rubbed over the membrane, which in such cases is almost insensible, and after a few applications will become blackened in patches, showing the usual effect of lunar caustic on dermoid structures. We must then desist until these dark scales peel off, and when they do, we should continue the application. Should, however, the membrane become vascular or inflamed during the process, the use of the caustic must be omitted until the parts become quiescent. The patient, if intelligent and careful, may be taught to apply the caustic, but the parts should be inspected at least once a fortnight. Under this plan of treatment I have succeeded in thinning the membrane and restoring hearing in most unpromising cases, whereas in others I have utterly failed. I have tried iodine and other substances, but have not succeeded with any so well as the nitrate of silver. Counter-irritation should at the same time be kept up over the mastoid process.

COLLAPSE OF THE MEMBRANA TYMPANI.

Collapse, or falling inwards, of the membrana tympani, toward the middle ear, is a very constant appearance observed in making aural examinations, as already remarked in the Analysis of the Registry at page 138, where this peculiar affection is described. I have remarked two forms of this peculiarity. In one the membrane is thickened, opaque, and exhibits all the evidences of previous inflammation; in the other, its texture is unaltered, it has merely become pressed inward towards the cavitas tympani, leaving the tubercle and handle of the malleus projecting outwards in strong relief. The former is always accompanied by severe deafness; with the latter form need only be associated tinnitus, although deafness often accompanies it. Cleland was aware of this peculiar condition of the membrana tympani more than one hundred years ago, as I have shown at page 14 of this work, to which passage I would here refer the reader. Several old authors have written upon a disease which they call relaxation of the membrana tympani,—Willis, Joseph Frank, and others, supposing that, when it was relaxed, it fell inwards, while Beck conceived that it pressed out towards the external auditory passage, which, I believe, only occurs from accumulations in the tympanum. Were we to rely upon authorities and not upon observations and facts, we might still look upon the question as undecided; but that the membrane is, from some cause or other, frequently rendered more concave than natural and pressed inwards toward the tympanum, does not admit of a doubt. Kramer, in his criticism of Willis, adduces as insupportable the assertion of some forms of deafness being improved by loud noises occurring in the vicinity,—as, for instance, while a drum was beaten in a room, and "that an individual, whose hearing was defective, heard everything during the ringing of a peal of bells." Yet, it is a well-established fact, that certain deaf individuals will be able to hear the human voice in its ordinary tones, and to enter into conversation while travelling in a carriage, walking in a street through which vehicles are passing, or under any circumstance in which the air is agitated by noises much louder than those in which the conversation they are

listening to are addressed. Thus, I knew an instance of a miller who could hear perfectly well ordinary conversation while standing within the working mill, but so soon as the mill ceased, or that he removed into another locality, he could only hear when spoken to in a much louder tone of voice. This peculiar symptom, a satisfactory explanation for which has not yet been given, has generally been enumerated as one of the characteristics of true nervous deafness. Thus, Kramer himself, when describing his "erethitic form of nervous deafness," says, notwithstanding his previous criticism of Willis, that, "if the patient sit in a cart which is rattling quickly over a stone pavement, or presses his forehead against the frame of a window whilst a waggon is rattling past, so that the whole house is shaken by it; or if a peal of bells be ringing near the patient, or a drum be beaten, the auditory nerve becomes *so excited* by those deep-toned uniform noises that, whilst they continue, the patient often hears the human voice better than a sound person whose ear is stunned by the noise." The facts are certainly as thus stated, but the inference does not follow. We have no authority for believing, neither are there any known physiological circumstances to warrant, the assertion, that the auditory nerve becomes thus excited; or, if excited by grave tones, that it is at that moment more capable of appreciating sharp or acute tones. This peculiar phenomenon has always appeared to me more explicable by a consideration of the state of the membrana tympani, and it is remarkable that it does not occur in cases where that structure has been in whole or in part removed. Cleland, as I have already remarked, believed that the altered position of the membrana tympani was caused by "a violent clap of thunder, noise of cannon, or the like." I do not remember having met with an instance arising from the former cause; but it is not improbable, that some of the cases of deafness which commonly occur among the artillery may be owing to a collapse of the membrana tympani.

The cause of collapse some writers have endeavoured to explain, by supposing that the tensor tympani muscle had snapped, or that the ossicula and mechanical apparatus of the middle ear had become deranged; but, from the fact that, in all cases of col-

lapse, the handle of the malleus is not drawn inwards along with the membrane on each side of it, I am not inclined to entertain that opinion. I believe the collapse may, in most instances, be attributable to one or other of two causes,—partial or complete closure of the Eustachian tube, by which means the pressure of the external atmosphere must of necessity drive the membrane inwards; and inflammation of the cavity of the tympanum, when adhesive bands have formed between the internal surface of the membrane and the neighbouring parts, which, as shown by the dissections of Mr. Toynbee at page 111, appeared in as many as 179 instances out of 915 examinations.

This is a cause of deafness most difficult to treat; but, unless some other disease coexist with it, we may generally assure the patient that the deafness will not increase. When once the membrane has been pressed for any length of time inwards, it is very difficult to restore its position permanently. Many persons inflate the drum, by holding the nose and making a forced expiration whenever they wish to hear what is said. In others we can temporarily restore the natural position by Eustachian catheterism; but in both the membrane returns to its former condition in a short time. I have tried the effect of exhausting the air in the external meatus by means of a syringe accurately adjusted to the outer aperture; but I have not effected any good thereby. On the contrary, I think the congestion produced by the exhaustion is rather detrimental to the organ. I have frequently afforded temporary relief by dropping with a glass tube a little nitrous ether into the meatus, and immediately stopping the external aperture either with the finger or by pressing the tragus over it. Some slight pain is instantaneously felt, followed by a boiling sensation, then a glow of heat, and a feeling, to use the patient's expression, as "if the drum of the ear was sucked out." It is difficult to understand how this remedy acts, and assists to restore the membrane to its normal position.

The following case, No. 15 in the Registry, showing thickening and collapse of the membrana tympani on both sides, is highly characteristic of the affections described in the three foregoing sections.

M. K., a married female, aged 46, has suffered from deafness accompanied by noise in her ears, occasional headachs, and general nervousness, for the last ten years. Cannot hear the ticking of the watch, though pressed against the ears, on either side. Her disease crept on gradually; is made worse on catching cold. She has not experienced pain in the ears, and has no hereditary tendency to deafness. The tongue is clean; throat normal; pulse natural; digestive functions healthy; the voice, however, is harsh, husky, and inharmonious, showing that she has been deaf a long time.

What have we learned from the subjective symptoms just detailed of the actual cause, proximate or remote, of the deafness in this case? Absolutely nothing. Its early history is obscure, and the symptoms described are common to many affections of the ear. By her ordinary medical attendant, if she was in a rank of life to have one, her disease would be set down as a case of "nervous deafness," because it has been of such long standing, has resisted or is now unamenable to treatment, and because this poor woman has, from her loss of hearing, and the noise in her ears, become "so nervous." Her treatment, she says, has consisted in being syringed by a doctor, who, finding the remedy ineffectual, then recommended her "not to be quacking, lest she might lose the little hearing she had;" in pouring "drops," which she saw advertised in a newspaper, into her ears every night for three weeks; in using "brandy and salt," which a charitable lady recommended to her as an infallible remedy when that nostrum was in vogue; in inserting a "piece of rusty bacon" into her ears at the suggestion of an "old woman;" in applying glycerine, because she heard it could do no harm; and, lastly, in having tobacco-smoke blown into her ears by a "travelling aurist," which caused her to faint, and rendered her weak and debilitated for several days after. Since then, having lost confidence in treatment, she has not ventured to seek relief.

Let us now see what is the state of the affected organ. The appearances are nearly the same on both sides; the meatus is rather smaller than natural, dry, vascular, and totally devoid of cerumen; the membrana tympani is thickened, white, and greatly

collapsed, so that the tubercle and handle of the malleus, to which it is attached, stand out much more prominently than they ought. Owing to the irritation produced by the insertion of the speculum, several red vessels have begun to appear upon the tympanal membrane, particularly along the site of the malleus. These are not the appearances of present inflammation, but are the result of the enlargement of the vessels, caused by long-continued previous inflammatory action ; and they are now rendered apparent by the slightest irritation. We constantly observe the same phenomenon in an eye which has recently suffered from internal ophthalmia. The conjunctiva and sclerotica may be, to all appearance, natural; but, upon rubbing the globe with the lid, or subjecting it to any other exciting process, we reproduce the well-marked pinkish zone round the cornea which characterizes inflammations of the internal tunics. This patient has not suffered pain in the ears, and the absence of this symptom is often brought up by medical men in proof of the non-inflammatory nature of the disease; but we all know now, that sub-acute inflammation may exist in other organs of the body,—in the lungs, the eye, the liver, and the mucous and serous membranes,—without the patient being sensible of pain. She cannot fully inflate the drum, but she can raise up the tympanal membrane a little—a proof that the Eustachian tube is free—and also render it more vascular. The inflammatory process has, in all likelihood, not been confined to the external membrane of the tympanum, but has spread over the mucous lining of that cavity; and it is more than probable that bands of adhesion exist in the middle ear, similar to those which dissection occasionally shows us between the pleura pulmonalis and pleura costalis, between the various reflections of the peritoneum, or between the back or pupillary edge of the iris and the anterior capsule of the lens.

As the amount of apparent disease, and the morbid changes which are manifest in this case, are insufficient to account for the great loss of hearing, we must attribute the defect to an extension of the inflammation from the middle into the external ear, affecting the vestibule and labyrinth, and possibly thickening or rendering invibratile the membrane of the fenestra rotunda. Analogy with the pathology of the eye here again assists us. In many

instances of internal ophthalmia do we not observe similar phenomena, where the amount of mischief done to the sensitive apparatus is not commensurate with the evidence of disease in the external mechanism, and the more delicate the organization, the less is the morbid product apparent? This woman's chief complaint is of the noise in her ears, which is so distressing that it disturbs her sleep, affects her mind, and prevents her following, with any degree of energy or interest, the ordinary occupations of life.

Treatment holds out but little hope of amendment in such a case as this, which is one of very common occurrence indeed, in this country. The strong solution of nitrate of silver applied upon the thickened membrane may produce some alleviation, particularly of the tinnitus; but, from the amount of collapse, it did not present a sufficient warrant to attempt relief by perforation. It is manifest that, when the membrana tympani is thus collapsed and bound down, it ceases to vibrate on the impingement of sound.

ARTIFICIAL PERFORATION OF THE MEMBRANA TYMPANI.

This seems the proper place to consider the propriety of perforating the membrana tympani, the cases to which it is applicable, and the best mode of performing it. Closure of the Eustachian tube, accumulation of extraneous matter within the tympanum, and the thickened condition of the membrana tympani previously described, are the circumstances which writers seem to think demand it. I do not believe it to be either required or applicable in the first class of cases; but that subject will be considered more at length in the chapter upon Diseases of the Eustachian tube. When we are convinced that the cavity of the tympanum is filled with uncoagulated blood, and that it cannot find exit through the Eustachian tube, an aperture may be made in the membrane to give it vent; but such an aperture, being intended to close after it has performed its office, is widely different from perforation made by cutting out a portion of that structure for the purpose of assisting hearing. To relate the whole history of the operation for perforation, the cures said to have been achieved by it, the various ingenious instruments invented for performing it, and the number of essays written by distinguished

men upon the subject, would occupy more space than it is worth in a practical work of this description—more particularly as the operation has fallen into disuse of late, Eustachian catheterism having in part superseded it, and several of the so-called cures not having stood the test of time and close investigation, so that no well-authenticated recoveries by the operation have been related for several years past.

To Sir Astley Cooper has been awarded the merit of first introducing the operation: he performed it with a small trochar, but the aperture made therewith was soon found to close. There has not been, perhaps, in the whole history of medicine during the present century a discovery to which so much praise was at the time awarded, that subsequent investigation and experience have, to say the least of it, so much disparaged. In the first place, the celebrated author was not, as I have shown at page 15, the original inventor of the operation; although I feel convinced he was unacquainted with Degravers' cases, but the fault lay with those who, perhaps, too rapidly, and without sufficient examination, awarded honours well due to the man, but undeserving the subject. Itard tried the operation in a great number of instances, but without any determined beneficial result. Kramer, whose work contains a very just review of the operation and the authors who have supported it, states, "that the thickening of this membrane, unaccompanied by any other disease of the ear, invariably affords the only true indication for its perforation." Himly invented an instrument which obviated the closure made by the simple puncture of the trochar, or any other piercing instrument, and this has been further modified by Fabrizzi and others. The very ingenious instrument of the latter consists in a fine, round stem, four inches long, fashioned at the end into a small corkscrew point, and enclosed within a canula working next the handle on a nut, and furnished at the point with a sharp steel cutting edge. When the punch or canula is screwed home, the twisted end of the stillette projects about the eighth of an inch beyond its extremity. With the end of the handle resting in the centre of the palm, and grasped by the middle ring and little fingers, the instrument is passed down to the membrana tympani, and then its spiral

point is inserted into either the anterior vibrating portion or the posterior clear space, and given one or two turns, so as to fix it into the membrane, which, being thus held fast, the bur or nut on the end of the canula is twisted between the thumb and index finger outwards, or from the operator, until by this circular motion the cutting end of the punch, revolving against the portion of the membrane held by the end of the stillette, cuts it out and removes it entire, leaving a round aperture the size of itself. This operation can only be safely performed with the aid of the speculum, and by having a stream of clear sunlight transmitted to the membrane. The head must be held against some resisting substance, and the patient should, if the Eustachian tube be free, be directed to inflate the tympanum at the moment. Still, the greatest delicacy of manipulation, and a fine, educated touch, are requisite. The objection to this and any similar instrument is that, from its size and the position of the handle, the view of the parts under operation is obscured. To remedy this defect Mr. Yearsley had an instrument made with a bend near the handle,—upon the principle of the curve which, some years ago, I recommended in the formation of all instruments employed upon the membrana tympani, and described at page 57.

With respect to the best situation for perforating, we find in books cautions about avoiding the chorda tympani nerve, which are quite unnecessary; for, in its arch across the tympanum, it is always far above the middle of the space either in front of or behind the extremity of the malleus.

In cases of permanent thickening and opacity of the membrana tympani, which have resisted all efforts at absorption and thinning, are we justified in performing perforation? I believe in very few cases indeed will it be found efficacious, because the opacity which we *do* see is but a portion of the general thickening and disorganization of the investing membrane of the middle ear, perhaps that of the labyrinth also, which we do *not* see. It may, however, be tried without injury in some cases, but it requires very great caution and dexterity indeed in its performance; and, as irreparable mischief has at times proceeded from its being done in a rough or clumsy manner, I beg to offer a few observations on the

safest method of performing it. I wholly discard all instruments in the shape of punches, trocars, and complicated apparatus for the removal of a portion of the membrane; because they all occupy so much space within the speculum that it is not possible to see accurately the point of the membrane which they are pressing upon, nor how much of it they are cutting; and, by our not seeing accurately the surface on which we are working, it is scarcely possible to avoid injuring the malleus, or wounding the inner wall of the tympanum; and, moreover, those with corkscrew points, which fix the membrane while the revolving punch cuts out the piece, are not only exceedingly painful, but dangerous, inasmuch as the slightest motion of the head during the operation might produce a degree of violence which would be destructive to this delicate structure.

Having brought the membrane fairly within view, under bright, direct sun-light, I introduce this small, sickle-shaped knife,



— with a double-cutting edge, and here figured of the natural size in the blade, but with the shaft and handle about two inches longer; and having made the patient inflate the tympanum, so as to render the membrane tense, and pressed outwards, I gently introduce the point of the knife into its inferior, thin, vibrating portion, and, drawing it downwards and forwards, make a simple incision of the membrane, about a line and a half in length. Occasionally I make a crucial incision. So simple is this, and so little pain does it give, that the patient is often unconscious of its performance until made aware of its completion by the air rushing out through the aperture. In about a minute a slight oozing of blood takes place from the edges of the aperture, like that which follows a wound of the sclerotic with an ordinary broad cataract needle; if left in this condition it would soon heal up; therefore, a very fine probe, fixed in a handle, and slightly pointed with nitrate of silver by being immersed in the caustic when heated to fluidity, should be immediately passed down into the perforation, the edges of which are thereby cauterized and prevented adhering; and this latter process should be repeated from time to time,

as often as the wound shows an inclination to heal, and until we establish a sufficiently large elliptical opening.

In 1846, Dr. Butcher, of this city, read a paper before the Surgical Society, on the subject of Perforation of the Membrana Tympani, with a view of showing the ill consequences resulting from the performance of that operation: and related the cases of two young persons, a man and a woman, in both of whom it would appear that death ensued from puncturing the membrane. Where fatal consequences are said to result from an operation which heretofore has proved, to say the least of it, innoxious, it is of very great importance that we should inquire into all the circumstances attending such cases, and the mode of performing the operation. The first instance was that of a young woman, said to be deaf in both ears for four years, the only history of whose case is, that prior to that period she got a severe cold, with a swelling of the glands of the neck; but what was the cause of her deafness, how it arose, what was the condition of the membrana tympani, why the operation was performed, in what manner, by whom, or with what instrument, we are not informed; all we know is, that "catheterism of the Eustachian tube was performed, and said to fail; hence it was agreed upon that the membrane of the tympanum should be pierced, a small piece being drilled out of the membrane of the right side;" but we are not told any other circumstances attending the operation, nor who witnessed it. Pain and other evidences of inflammation in the ear ensued, and profuse discharge took place, but what the condition of the ear was we know not. At the end of four months she died, with symptoms of diseased brain; and upon examination it was found that the dura mater covering the petrous portion of the temporal bone was roughened and softened in its texture, particularly near the internal auditory foramen. The membrana tympani was *entirely destroyed*, and the lining membrane of the tympanum thickened and villous. Now, while we are totally in the dark as to what the original condition of this case was, it is manifest that some great violence must have been done to the drum of the ear in the performance of the operation.

The second case is equally defective as to the cause of deafness

or the appearance of the ear, although the post-mortem examination was most interesting; all Dr. Butcher states is, that the man was deaf for twelve months previously; that he then applied to a surgeon, and had his tympanum pierced (?); but why, or whether with a gimlet or a punch, a trochar or a probe, we are not informed. At first the hearing was improved, but then relapsed; after some time head symptoms set in, and the man died in the course of six weeks. Upon dissection, evident traces of inflammation of the brain and its membranes were discovered; the dura mater in particular, covering the auditory portion of the temporal bone, was rough and thickened, and a small abscess was discovered in the anterior lobe of the brain, upon the same side on which the perforation was said to have been performed. In this case, however, the original cause of the deafness, namely, a small tumour about the size of a bean, lying on the auditory portion of the seventh pair of nerves, was discovered. This was evidently a case in which the operation never should have been resorted to. Dr. Butcher deserves much credit for making those cases public, but it is to be regretted that the statement of the surgeon who performed the operation, whatever it was, was not obtained, nor the appearances of the ear, both before and after the operation, described. (These cases are detailed in the Dublin Medical Press, April 1, 1846.)

ACCIDENTAL PERFORATION OF THE MEMBRANA TYMPANI.

An aperture of the membrana tympani may occur from a variety of causes. It may exist congenitally, it may happen by accident, such as a penetrating instrument, a foreign body in the meatus, loud sudden noises, sneezing, coughing, or blowing the nose, diving to any great depth, falls and blows upon the head, all of which have been detailed under the head of wounds and injuries of this structure, at page 220. We now come to inquire into its condition when perforated by disease, the result of inflammation, &c. An ulcer may eat its way through, and leave from loss of substance a permanent opening; but the most frequent cause of perforation is otitis, or inflammation of the membrane, in common with the lining of the cavitas tympani; when in the suppuration which ensues, the pent-up matter bursts through the inflamed

membrane as the nearest external outlet, and the case is then one of otorrhœa. I do not think the membrana tympani is often perforated as the result of inflammation confined to its own proper laminæ.

In cases of perforation, the opening is generally opposite the aperture of the Eustachian tube, which would rather lead us to believe that it is caused by a burst or rupture of the membrane, owing to a sudden jet of air striking against this thin portion of it while in a state of inflammation and tension, rather than that it was produced by either sloughing or ulceration. When a cornea is about to perish in whole or in part from sloughing, hypopyum, or penetrating ulcer, we have an opportunity of observing the process from hour to hour. It is not so, however, in cases of inflammation of the ear; we have seldom an opportunity of examining the part until the mischief has occurred. When the disease happens during measles or scarlatina, the ordinary medical attendant pays but little attention to the state of the ears, although the patient frequently complains of excruciating pains therein. He is satisfied with attending to the state of the fever and the eruption, telling the friends that the aural affection can be easily rectified after the patient's recovery. It must, however, be acknowledged, that in many instances the general symptoms of the disease are of such a threatening character, that both the physician and the friends are well satisfied if the patient escapes with life. Nevertheless, I cannot but feel, that an examination with the speculum should be made in all such cases, and means taken to relieve the aural disease by the application of a few leeches, &c. I have frequently saved eyes in patients labouring under small-pox, by employing the ordinary remedies applicable to pustules in the cornea.

In cases of inflammation of the middle ear and membrana tympani, we will generally find, upon examination, that the latter is one uniform sheet of redness, without any appearance of pointing, sloughing, or ulceration; and, within a few hours after, the patient will tell us that he is relieved of his pain by something having suddenly burst in his ear, and then, upon inspection, we find an opening in the membrana tympani.

In perforation, particularly if the aperture is large, the patient

generally complains of some of the water getting into the throat in syringing.

At page 139, I have already remarked upon the general characters and most usual position of the aperture in the membrane. Where there is no obstruction in the meatus, we can, by directing a stream of strong sunlight through the speculum, easily detect the rupture, unless it is either very small or valvular. If of long standing, its edge is generally red and thickened, and the space behind it is usually very dark, but we cannot be certain of the precise colour unless the aperture is of a moderate size. When a large portion of the membrane has been removed, as is often the case in ears long affected with otorrhœa, we can with facility perceive the colour of the mucous membrane of the tympanum, which from its exposure, and the state of chronic irritation in which it must be, is usually thickened, often granular, and always of a deep bright red; and, moreover, the edge of the aperture throws a dark shadow upon the inner wall of the tympanum beyond, which we can alter by changing the position of the head or the speculum, in the same way that a shadow is seen between the margin of the pupil, and an opaque lens behind, if the two are not in contact. In cases of extensive destruction of the membrane, where, upon introducing the speculum, we merely observe a florid red vascular surface, an unpractised eye may find it difficult to determine by mere inspection whether the surface brought into view at the bottom of the meatus is the surface of a carneous membrana tympani or the inner wall of the tympanum itself. The difference can at once be distinguished by passing down a fine probe,* and gently percussing the surface we are looking at, and if it be that of the tympanum, a delicate touch at once detects the difference of texture; while, if the contrary, the patient is always conscious of something knocking against the skull, but generally complains less than if the probe touched the membrana tympani. The part most usually presented is the promontory.

* When we have occasion to use a probe for examining the ear, it should be about three inches long, fixed in a handle, have rather a large button on the end, and be very slender for about an inch behind the extremity, so that it will bend with facility should the patient move the head in the direction of the instrument.

When the membrane has been eaten away by ulceration, or so much of its lower portion destroyed by rupture or other circumstances as to cease to be a fixed point for the manubrium of the malleus, the ossicula, or at least whatever remnant of them remains, are drawn upwards and backwards, and generally present with the remaining portion of the membrane a well-defined protuberance, generally whiter than the rest.

Where we have any difficulty in detecting an aperture, we should direct the patient to force air into the drum, when the squeeling, gurgling, or whistling sound produced by its transit through the rupture will decide the question,—supposing the Eustachian tube to be free, which, in some cases, it is not. When, in cases of recent otitis, the meatus is thickened, and both it and the external surface of the membrana tympani covered with a layer of white macerated cuticle and flakes of discharge, it is sometimes difficult, by mere inspection alone, to decide the question, particularly if direct sunlight is not available at the moment. Some time ago I described two diagnostic symptoms, one or other of which, when present, are unfailing indications of rupture. If, on looking into the meatus, even without a speculum, we see a single globule of air entangled in the discharge which generally fills it, we may rest assured that the tympanal cavity is open externally. If we do not at first see this globule, and that we press upon the root of the tragus with the point of the finger, we can generally, if the tympanum is open, bring it to the surface. I suppose it is forced up through the Eustachian tube in sneezing or coughing, &c., and finds its way from the tympanal cavity to the surface of the fluid. Sometimes the bottom of the meatus is filled with several air-bubbles, which generally coalesce upon the introduction of the speculum. Some years ago I was called to see a gentleman said to be labouring under fever; he was from the commencement extremely deaf, and had complained of violent pain in his ears and head; he had great heat of skin, loss of rest, a brown furred tongue, great thirst, some intolerance of light, a very quick pulse, and other febrile symptoms. Upon the fifth day a purulent discharge was observed to issue from both his ears, when the attention of the medical attendant was first attracted to the organs of hearing. I

saw him upon the sixth day; he was then so deaf that he had to be communicated with by writing. On examination I found several air-bubbles mixed with the discharge which poured from his ears; and I at once stated to the practitioner in attendance, what subsequently proved to be correct, that the case was one of otitis, in which the tympanal membranes had given way to allow exit to the pent-up pus. From the condition of the patient at the time I saw him, it was not possible to make an accurate examination, neither was such at the moment necessary. Two days afterwards, upon removing the discharge, an aperture was found in the antero-inferior part of the membrana tympani, opposite the Eustachian tube, on each side. These apertures subsequently closed, and the gentleman recovered his hearing. I have remarked that a rupture of the membrane, produced, like this, from otitis, heals more readily, and often without treatment, than that produced by chronic otorrhœa; the former being a rupture, the latter an ulcer, and, consequently, attended with a greater loss of substance. While correcting these pages, I was consulted by a lady for deafness of the left ear. Upon examining the right, about which she made no complaint, I found the membrana tympani thickened and opaque, except one abnormally thin portion in the centre, which was rather depressed beneath the surrounding surface. Upon expressing an opinion that she must have had some inflammatory action in that ear previously, she acknowledged that nineteen years before, she had had a "severe boelding" which kept her awake several nights, until relieved by a discharge of matter, which continued to flow from her ear for some months subsequently. I suppose the rent was filled up by the delicate bit of membrane still apparent in the centre of the drum-head.

Another curious phenomenon, which has not, as far as I am aware, been previously described by authors, is,—that, when the membrane is perforate, and that an air globule exists at the bottom of the meatus, we can, by keeping the eye steadily fixed upon it,—and as its bright convex surface generally reflects the light, it is easily seen,—perceive that it pulsates, and that its action is synchronous with that of the heart and arteries. It is not an invariable symptom, and the pulsation sometimes intermits. In order to see

in perfection, there ought to be but a slight coating of thin discharge at the bottom of the meatus, and the globule from which the light is thus brilliantly reflected should be either entangled in or opposite the opening in the membrana tympani. In most of the cases in which I have remarked it, the aperture was rather small, and situated in the posterior part of the membrane. I have never seen it where the opening was very large, or the membrane entirely destroyed. It is an additional proof that the membrane pulsates, certainly in disease, and probably in a normal condition also; although we are not in a position to detect its motion. (See additional remarks upon this subject at page 218.) As already stated, the rupture usually takes place in the anterior portion, and close to the opening of the Eustachian tube; sometimes it may be seen as a round or oval hole, about the size of No. 8 shot, and appearing as if punched out of the membrane. In other instances it occurs at the anterior inferior edge of the membrane, in which case the lower margin of the aperture is formed by the parietes of the canal and cavity of the tympanum. In still rarer instances the rupture takes place in the posterior division of the membrane, below, and somewhat behind, the point of the malleus. Sometimes the aperture presents a kidney shape round the manubrium, which projects into it like a peninsula.

The treatment of an aperture in the membrana tympani, and the success which is likely to attend it, must depend upon its cause, duration, and extent: the older, the less likely to heal, and if from ulceration, it is also more unpromising than when it has taken place from mechanical injury or the pressure of accumulated fluid.

An aperture, even of considerable size, may exist in the membrana tympani, without otorrhœa, but upon the slightest accession of cold, otorrhœa will occur from the surface of the exposed tympanal cavity. The prognosis is uncertain. I have sometimes failed in healing very small apertures, while much larger ones have, to my surprise, closed, under treatment, in a very short time.

After a long and fair trial of several means proposed for healing apertures in the membrana tympani, I have come to the conclusion, that there is nothing like nitrate of silver. It will not,

however, answer to thrust a stick of lunar caustic, fastened in a quill, down the meatus, for the purpose of touching any part of the membrana tympani; to be used with effect, the escharotic should be applied upon the extreme edge of the aperture, or rather within the ring of the opening, every second or third day, so long as the part seems inclined to close, but the moment we perceive it enlarging, a day or two after the application, we must desist. As it is not always possible to reduce a pencil of nitrate of silver to the requisite degree of fineness, I have, for several years past, been in the habit of pointing probes and other instruments used in minor surgery, with nitrate of silver attached to them, in the following manner:—a portion of the caustic is to be melted to the boiling point, in a small silver or platina ladle, such as that represented below, held over a spirit lamp. When the caustic has



become quite clear, the point of the probe or instrument to which it is to be attached should be heated in the flame of the lamp, and then dipped into the fluid caustic several times, until a sufficient quantity is taken up. By this means, we can point a needle with caustic, should it be necessary to apply it to any minute part, such as an ulcer on the eye, &c.* The instrument figured below will be found very convenient for applying nitrate of silver to any



surface within the meatus. This *porte-caustic* is about six inches long, and consists of a silver tube, cut spirally for three-fifths of its length, and having an aperture in the side, or a hollow at end. When about to be used, its extremity should be coated with caustic, as already directed. The elastic spring prevents any injury

* Dr. M'Donnell, of Montreal, formerly of Dublin, wrote an article in the Medical Journal of that city some years ago, to show that I was not the original inventor of this ingenious application of this very useful remedy, and that Dr. Morgan of this city was the person to whom the credit belongs. When, in January, 1844, I first recommended it, I feel sure that, if I had remembered Dr. Morgan's suggestion, I would have mentioned it, as I have all my life laboured to "render tribute to whom tribute is due;" and I therefore take this opportunity of rendering my townsman due credit for the suggestion.

to the ear from the starting of the patient, and can also be bent, so as to be applied with ease to any part of the auditory canal. When granulations sprout from a perforation in the membrane—which is very rare, unless the rupture occurs immediately adjoining its edge—this mode of applying caustic will be found very effectual, as well as for the eradication of small polypi; but I have never yet seen a polypus attached to the membrana tympani.

When the membrana tympani is perforated, and that we touch it, or a polypous growth, or sometimes even an abraded spot upon the surface of the meatus, with solid nitrate of silver, it is, in many cases, tasted in the mouth almost immediately, but only on the side to which it has been applied. Patients say, "they feel the impression of the caustic running down along that side of the tongue, but not reaching the lip." I never knew this peculiarity, except where there was a hole in the membrane. Is it transmitted by continuity of mucous surface, or by means of the chorda tympani ?

The following case, No. 2 in the Registry, of chronic thickening of the left, and total loss of the right, membrana tympani, will be found illustrative of the foregoing observations:—

E. S., a female, aged 25, suffered from disease of the ears since she had scarlatina, three or four years ago; has had "a running" from one ear, but never experienced any pain on either side, and never had medical advice. A constant buzzing noise is present in the left ear; none whatever in the right. Hearing distance on the right side, five inches; on the left only on pressing the watch to the external ear; hears the watch well on placing it between the front teeth. Upon examination, we find chronic inflammation, attended with muco-purulent discharge, in the right ear. On bringing the bottom of the meatus auditorius into view, we perceive a smooth, deep-red, moist, and irregularly concave surface: this is the inner wall of the tympanum, the mucous membrane covering which, by being so long exposed to the atmosphere, has assumed this peculiar florid and villous appearance. The eye informs us that we are not looking at the membrana tympani; the peculiar curve of the surface that meets the view, the hue of colour,

and the great depth at which it is placed, would, even if one were not well acquainted with the appearance, at once lead us to say that the membrane had been removed; and, on passing down a fine round-headed probe, it knocks against the bony protuberance of the promontory. The spot where the probe touched has become of a much deeper red, and the patient says she experienced a sensation as if something was knocking loudly against the side of her head. Towards the upper and posterior side there is a white projection, the displaced malleus, from which a shadow is thrown upon the red surface of the tympanal cavity. The shadow thrown from it proves that it is not in contact with the deep surface we are looking at: in the same way as the shadow cast by the pupillary margin of the iris tells us the position of the opacity, and other circumstances of great importance, in a practical point of view, in cases of cataract. Towards the lower and anterior edge of the cavity may be observed a spot darker than the rest,—the aural opening of the Eustachian tube,—but the patient is unable to pass air through it. When this tympanal membrane was destroyed we know not; probably an aperture occurred in it during the scarlet fever, from which she suffered at the time her deafness came on, and, by ulceration, it has since extended. I am inclined to think this has been the process; for she says the discharge under which she formerly laboured, and which was so great as to pour out of the external meatus and soil her dress, has of late considerably lessened, and is now very slight, and about the consistence of made starch. This accords with my experience of those discharges. In cases of polypus, without any aperture in the tympanal membrane, the discharge is always profuse, and usually purulent; where there is an aperture in the membrane, it is, generally speaking, not so abundant, but more mucous; and where the membrane has been almost entirely removed, as in this case, the discharge frequently lessens. Sometimes there is scarcely sufficient secretion, and patients are in the habit of moistening the ear with a drop of water applied with the end of the finger. I know a gentleman who does so every day after dinner when he wishes to hear well, and he has an aperture in his membrana tympani. As already stated, this

patient has no noise upon this (the right) side. Where the membrane has a large aperture in it, or has been completely removed, I have generally, but not invariably, observed, that there is no tinnitus aurium, or, if such existed upon the first accession of deafness, it ceases as soon as the membrane has become so much destroyed as in this case, unless it had been originally cerebral. Therefore it is that some persons have derived relief from this most distressing symptom by having the membrane perforated, although the removal of the deafness could not be expected.

This woman hears at five inches distance upon the right side; but she hears the voice better than other persons who possess a hearing distance by the watch of some inches more: this is worthy of remark, and applies to a vast number of deaf cases. Some persons are better able to understand the purport of discourse from a natural quickness of comprehension, and will maintain a conversation although they cannot hear the watch at two inches distance; while others who hear the watch at three times that distance exhibit a dulness of general hearing that is quite remarkable. I have observed that, when once the tympanal membrane has become permanently open, the larger the aperture, the greater the amount of hearing, provided no further mischief has taken place, and that there is a slight ring or circle of the membrane still remaining.

Artificial Membrana Tympani.—A complete cure for deafness arising from an aperture of the tympanal membrane, by passing a portion of wool or raw cotton, moistened with some fluid, into the bottom of the meatus, was published in July, 1848. I became aware of the fact about eight years ago, through a lady resident in Clonmel, who discovered it, she told me, by accident. Considering hers an isolated case, and having my attention directed particularly to other subjects at the moment, I thought no more about the matter then. The lady informs me, in answer to a recent communication, that the disease in her ears originated in what she styles brain fever, eighteen years ago, but that the physicians whom she consulted told her that her aural affection was merely nervousness, and that the drums of her ears were quite unaffected. "Suffering," she says, "so dreadfully from deafness,

and a suffocating feel about my head, I resorted to many experiments. At last I was recommended to try a piece of fat bacon, toasted over a candle, and then put into the ears. I used it for a long time, but eventually I was obliged to discontinue it, as it hurt me very much. I then dropped oil into my ears instead, and it for a while enabled to hear, but in an hour or two afterwards I used to be as deaf as ever; so I naturally thought that, by putting a little wool with the oil into my ear, and thus keeping up the moisture, it would answer the purpose. This I tried, and found it most efficacious. I must, however, have it settled in one particular spot in my ear, or it would be quite useless, and were I to take it out I would not hear a word. I generally arrange it with a large pin or bodkin, and, when fixed properly, I have no occasion to change it for three days together."—A. Mc S.

To Mr. Yearsley we are, however, indebted for making this valuable discovery known, as already stated at page 35; and although Deleau and others have claimed acquaintance with the fact, it is manifest that they made no use of it.* The subject is one that has lately engaged, and very justly, much attention, and I have recently verified in numerous cases the opinion which I have on a former occasion expressed of its value.

A gentleman, about fifty years of age, caught a violent cold by being much exposed during the night air among some of the snowy mountains and glaciers of Switzerland a year and a half previous to the time I saw him. He was attacked with dull aching pains in his ears, attended with considerable deafness. He said—and being a person of great intelligence and some scientific acquirements, I was constrained to believe his statement—that, upon applying for advice in one of the large towns in Switzerland, a mixture containing muriatic acid was prescribed for him, in order "to alleviate the pain and stimulate the drum of his ears." Shortly after the first application, which, unfortunately, was made on both sides, he had a violent attack of ear-ache, which, he states, "nearly set him mad," but that he got relief as soon as something burst in his ears, and that a discharge was established. Having

* See Medical Times for 12th April, 1851, p. 412.

heard of the glycerine-and-cotton remedy, he applied it, and succeeded once, but never after, in gaining relief. Upon inquiry, I found that he had completely filled the meatus with a plug of wool and glycerine. On examination, I found that the tympanal membrane had been altogether removed upon one side, and but a slight remnant of it remained upon the other. He had a good deal of discharge; no noise; but he was so deaf that one required to shout to him; and he came to me to recommend him some sort of hearing-trumpet. The mucous membrane of the tympanal cavity and the meatus were in a state of chronic inflammation, which, being lessened by the application of a solution of nitrate of silver and other means employed for a few days, I introduced bits of moistened cotton in the manner previously described. His hearing was instantaneously restored; and, having taught him after a few visits how to manage the application himself, he was again able to join society almost as well as ever.

Highly valuable, however, as, no doubt, this remedy is, it is, in its application and usefulness, variable. In some cases what it will effect is quite marvellous,—almost instantaneous restoration to comfortable hearing; but, in other instances, it does not succeed so well, or even at all. The cases in which it is most effectual are those where there is a very large aperture in, but not a total destruction of, the membrana tympani. It requires some tact to hit off the exact position in which to place the bit of cotton; but, the moment it is done, either by the practitioner or the patient, the hearing is restored. It should be made to fit on or into the aperture in the membrane, not completely to block up the meatus, nor to press against the inner wall of the tympanum. It ought to be passed down with a fine forceps or probe, and patients should be taught how to introduce it themselves; the lady by whom I first saw it employed always carried a bodkin, a little fine wool, and a bottle of oil, for the purpose. I do not think it matters much what the fluid is; I generally use fine oil, and, after the bit of cotton is saturated with it, I press it gently between the fingers. As there is always some discharge from the exposed mucous membrane in these cases, a sufficient moisture is kept up for two or three days; but the wool or cotton should be removed from time to time, according to the

patient's own sensations, and never allowed to remain in longer than three or four days. If there be much discharge present, the wool or cotton may require removal daily. It is astonishing with what adroitness a patient will sometimes hit off the necessary position of the cotton, even after the practitioner has failed to adjust it. Notwithstanding some ingenious attempts at explanation, we still require a feasible solution as to how this remedy acts.

Mr. Toynbee has recently recommended a thin plate of vulcanized India rubber or gutta percha, attached to a wire stem, as an artificial tympanic membrane, in lieu of the wool or cotton remedy.* I have no experience of it; but I doubt its general applicability.

In the foregoing chapter I may to some have appeared prolix; but, upon a subject comparatively so new in English literature, so little studied, and consequently so little understood by practitioners in general, it was not possible to explain my meaning without entering into minute descriptions. Moreover, from the circumstance of the membrana tympani being the part most easily examined, being that most frequently affected, and, consequently, affording the safest means for diagnosis either for deafness arising from affections peculiar to itself, and confined to its own structure, or which it exhibits in common with other and deeper-seated structures similarly diseased, it frequently affords us not only the surest but the only faithful indication for forming an accurate diagnosis. If aural diseases were as attentively studied in these kingdoms as ophthalmic or obstetric affections, then would the lengthened description of cases be unnecessary; but where do we find, throughout the whole circle of our periodical literature, half-a-dozen well observed and accurately noted cases of disease of the ear in a twelvemonth? Faithful observation and clinical records of disease are now more required in this than in any other branch of medical science.

* See Medical Times and Gazette for February 12, 1853.

CHAPTER VI.

DISEASES OF THE MIDDLE EAR AND EUSTACHIAN TUBE.

Anatomy of the Cavitas Tympani.—Apertures, Ossicula, and Investing Membrane.—The Eustachian Tube and Tonsils.—Congenital Malformations of the Middle Ear.—Wounds and Injuries; Hemorrhage and Serous Effusion.—Inflammations: Acute Otitis; Otorrhœa; Subacute Otitis; Exanthematous and Typhoid; Acquired Dumbness; Facial Paralysis.—Rheumatic Otitis; Periosteal; Caries.—Diseases of Mastoid Cells.—Affections of the Ossicula.—Morbid Growths in the Tympanum: Polypus; Exostosis.—Catarrhal and Chronic Otitis: Ablution, Fumigation, and Bougie Exploration of Tympanum.—Malignant Fungus.—Diseases of the Eustachian Tube; Foreign Bodies in; Inflammation; Obstruction.—Throat Deafness.—Enlarged Tonsils and Cleft Palate.

ALTHOUGH I have separated the diseases of the Eustachian tube from those of the cavitas tympani in the Nosological Table, in accordance with the anatomical basis observed in their general division; still, in a pathological point of view, these two parts may as fairly be classed together as the diseases of the middle ear and the mastoid cells.

The middle division of the auditory apparatus, the tympanum or cavitas tympani, is that space between the membrana tympani externally, which separates it from the auditory tube, and the outer wall of the internal ear or labyrinth. It resembles the form of its external septum, but is rather more irregular in its circumferential boundary. It is somewhat wedge-shaped, being narrow below and broad above, owing to the oblique position of the membrana tympani, and measures about three-eighths, or from that to half an inch in its longest diameter. In the dry bone it has five special outlets,—externally into the osseous meatus;—internally by two small apertures, which communicate with the labyrinth, called from their shape the round and the oval window,—two proceeding from the circumference; of these, that anteriorly, and a little below the middle horizontal line, is the entrance of the Eustachian tube, which communicates with the throat; and one or more openings lead in the adult into the mastoid cells superiorly and

posteriorly. Viewed from without, by making a section of the temporal bone immediately beyond the groove for the attachment of the membrana tympani, we observe upon its inner wall a projection of densely hard bone dividing the two apertures already alluded to, both of which are placed in the posterior half, and consequently immediately opposite the external outlet of the osseous auditory canal and the posterior vibrating portion of the membrana tympani. This protuberance is the promontory caused by the projection of the cochlea: the inferior opening is the fenestra rotunda, somewhat triangular in shape, and in the recent state closed by a delicate membrane analogous to the membrana tympani, and which may be called the internal drum-head, which separates the tympanum from the extremity of the cochlea, and hence called the fenestra cochleæ. As this membrane serves to transmit vibrations of sound, and is the only barrier to the escape of the fluid contained within the labyrinth, it is manifest that any interference with its functions, any alterations or organic changes in its structure, or its total destruction from sloughing, ulceration, or caries of its bony attachment, must be attended with considerable impairment, if not total loss, of hearing. When the tympanic cavity is exposed by extensive destruction of its outer membrane, we do not see the little membrane of the cochlear fenestra; the whole looks one uniform red surface, and in this state the physiology of hearing has not yet been satisfactorily explained; but I presume that the waves of sound impinge directly upon this membrane, and sensations are thus conveyed to the internal ear. That the membrane vibrates is proved by experiment, and one use of it may be to allow the fluid contained within the vestibule, when pressed upon by the base of the stapes—covering, like a lid, the fenestra ovalis—to bulge a little into the cavity of the tympanum. But that this latter must be a secondary object is proved by the amount of hearing possessed by persons who have suffered from extensive destruction of the membrana tympani, or have even lost some of the ossicles.

The superior opening is, as its name implies, oval or ovoid for the reception of the base of the stapes, which fits into it somewhat like a stopper, or the piston of a cylinder, and is attached to its circumferance by a ligamento-fibrous membrane, which allows a double motion to the small bone which it surrounds,—a

stopper-like one by which it is forced towards the cavity of the vestibule, with which this opening communicates,—and a lateral or oscillating one by which each of its extremities can be made to press inwards in turn.* The surface of the promontory is grooved for the ramification of the tympanic branches from the glosso-pharyngeal nerve. Traversing the superior wall of the tympanum, immediately above the fenestra ovalis, is the aqueduct of Fallopius for the transmission of the facial portion of the seventh pair of nerves, which projects somewhat into the roof of the tympanic cavity, and the relations of which have already been remarked upon at page 214. Posteriorly and immediately below this conduit of the facial, we observe a little conical eminence called the pyramid, in the apex of which there is a depression leading into an opening which gives insertion to the stapedius muscle.

From the large sinus in the roof of the tympanum, or sometimes by one or two openings in addition, the mastoid cells communicate freely with the cavitas tympani, and it is of great importance to bear this communication in mind, when inflammation attacks the tympanum, which space, as well as these mastoid cells, are separated from the cavity of the cranium by a thin and often delicate lamina of bone, pierced by several small apertures for the transmission of vessels to the dura mater, which adheres intimately to the superior surface of the bone at this place.

Anteriorly and somewhat inferiorly the whole side of the tympanal cavity, from the attachment of the membrana tympani in front to the root of the promontory behind, may be seen the smooth trumpet-shaped entrance of the Eustachian tube; and not, as is described in books, commencing by a small aperture; on the contrary, it is the widest part of the bony portion of that canal. Along its posterior margin, somewhat above the middle, a delicate concave shelf of bone stands out, which forms the floor of a canal,

* See the splendid work of Professor Hyrtl of Vienna, upon the Comparative Anatomy of the Ear, "*Vergleichend-anatomische Untersuchungen über das innere Gehörorgan des Menschen und der Saugethiere.*" See also, in addition to the various works upon Anatomy, and Mr. Wharton Jones' Essay in the Cyclopædia of Anatomy and Physiology, the recently published paper by Mr. Toynbee "On the Functions of the Muscles of the Tympanum in the Human Ear," in the British and Foreign Medico-Chirurgical Review for January, 1853.

completed by fibrous membrane, through which the tensor tympani muscle plays. The length of the bony portion of the Eustachian tube is about half an inch, and of an irregular elliptical figure, sometimes resembling a mere slit, and seldom admitting, even in the dry bone, anything larger than an ordinary-sized dressing probe, and certainly not capable of giving transit to the great majority of the bougies and other instruments recommended by aurists to be passed through it for the purpose of clearing it, or of *exploring* (?) the cavitas tympani.

The parts contained within the tympanum are:—the ossicula auditus, the muscles by which these bones are moved, and the chorda tympani nerve, which in its circuitous course traverses the upper part of this cavity.

This chain of small bones has three points of attachment,—the membrana tympani, and the fenestra ovalis, between which they stretch, and the walls of the tympanum, which afford them support. They consist of the malleus or hammer, the incus or anvil, and the stapes or stirrup; to which some anatomists have added a fourth bone, under the name of the orbicular, but which is now believed to be a portion of the incus. All these bones, when placed together, form an arched chain of levers, extending across the upper and back portion of the tympanal cavity, and which by their motions serve to convey vibrations of sound from the membrana tympani, to which they are attached externally, to the fenestra ovalis, where the inner leg of the arch is fastened; and also to place both the membrana tympani and the membrane of the fenestra rotunda in particular states of tension or relaxation, whereby they can be affected by sounds more or less grave or acute. For this latter purpose their mechanism is under the control of muscles probably of the voluntary class. The malleus or hammer consists of a body fitted into a corresponding surface in the incus; a head rising into the tympanic sinus above the attachment of the membrana tympani; a manubrium or handle stretching down between the laminæ of the latter structure, to which it gives insertion and support, as already explained at page 215; a tubercle between the body or neck and handle, which is always recognisable through the membrana tympani;

and a long slender process, which, springing at a right angle from the rest of the bone, crosses the tympanal cavity obliquely from behind forwards, and a little downwards towards the Glasserian fissure, where it is attached near the edge of the tympanic ring. The incus is also an irregularly-shaped bone, not inaptly resembling a bicuspid tooth; the crown of which is articulated to a corresponding surface upon the malleus, and the two fangs or crura are attached, the shorter by ligament to the roof of the tympanum near the orifice of the mastoid cells, and the long process, extending downwards nearly parallel with the handle of the malleus, but towards the inner wall of the tympanum is articulated with the head of the stapes. The stapes itself, which in its similitude to a stirrup is perhaps the most exact resemblance which any portion of anatomy has yet derived a name from, is set by its base into the opening of the vestibule, and thus completes the connecting links between the external and internal ears. From the anatomical relations of this bone, and its acting either with an intervening membrane—the membrana vestibuli of former anatomists—or simply by ligamentous connexions to the edge of the foramen ovalis, as the principal barrier to the escape of the contents of the vestibuli, the semicircular canals, and even the cochlea, its total destruction or removal must be attended with irreparable loss of hearing, unless the foramen ovalis becomes filled up with a new or false membrane, and that the labyrinthine fluid re-accumulates. Fortunately, this little bone is less frequently lost in otorrhœa than either of the others. The various articular surfaces between these minute bones are incrusted with cartilages, provided with synovial membranes, and held together by minute ligaments.*

The muscles which move these small bones are the tensor tympani and the stapedius; the former of which arises in the osseo-

* It is said that at birth the ossicles are as large as in the adult. The stapes, says Mr. Williams, "weighs, when dried, one thirty-second of a grain." This is a great exaggeration. I find that from five to six of these little bones weigh, in the dry state, a grain. The same author, in that Treatise for which the University of Edinburgh awarded a gold medal, states that "the membrana tympani is *covered* with wax, which is for the purpose of modifying sound"!!

cartilaginous canal above the Eustachian tube already described, and, crossing the upper portion of the tympanum, is attached to the malleus near the junction of the tubercle and handle, which bone it draws inwards and forwards, and so assists to render the membrane, which it supports, concave externally; but whether that structure is really rendered more tense or more relaxed by this action, remains for further investigation. It would appear from observing the mechanism of the chain of bones extending between the external and internal walls of the tympanum, that the action of the tensor tympani must, by drawing the malleus inwards, affect the position and motions of the stapes upon or within the fenestra ovalis. If, as anatomists suppose, the action of the tensor tympani assists indirectly to press the base of the stapes inwards towards the cavity of the vestibule, it is manifest that it must affect the fluid of the labyrinth, and by its means press outwards the membrane of the fenestra rotunda. But if the long leg of the incus, through which the motion of the tensor tympani is conveyed to the top of the stapes (instead of pressing point-blank against that bone in its ordinary horizontal position, so as to bear upon it like the piston rod of a cylinder), presses it obliquely, and gives its base an oscillatory motion, it is as likely to relax the membrane of the fenestra rotunda by withdrawing the pressure of a portion of the stapes from the fenestra ovalis. And the oblique position at which the incus articulates with the stapes renders this probable; so that it is only by a combined action of the tensor tympani and stapedius muscles that the base of the stapes can be pressed directly inwards against the fluid of the vestibule. The stapedius muscle, which is much shorter and smaller than the preceding, arises within the aperture of the pyramid, and is inserted into the head of the stapes. By some it is supposed to act as an antagonist to the tensor tympani; and this opinion receives support from the fact, that it is supplied by a branch from the facial nerve, while the latter receives its nervous supply from the otic ganglion; but, says Mr. Wharton Jones, "the principal nerve of the tensor tympani is derived from the pterygoid nerve of the third branch of the fifth." Its action is to draw the stapes backwards, and consequently elevate that por-

tion of its base contained within the anterior edge of the fenestra ovalis. It is remarkable, that both these muscles have their origin within fine bony canals which, projecting somewhat into the tympanal cavity, serve to give them an exact and special direction; and, as particularly occurs in the case of the tensor tympani, by means of pulley-like tendons, slightly to alter the original direction of their course. Both muscles acting together, the tensor tympani, by pressing the anterior edge of the base of the stapes, and the stapedius its posterior extremity, must press it inwards, and so affect the fluid of the labyrinth and the membrane of the fenestra rotunda.

The action of these bones and muscles is twofold—when vibrations of sound impinge on the membrana tympani to convey its minutest motion across the tympanum, and communicate such to the labyrinth; and also to act as the analogue of the iris, and thus, by regulating the state of tension of the different structures thrown into vibration, to control the amount of sonorous undulations that pass to the labyrinth. With respect to the problem regarding the voluntary action of the tympanic muscles, Mr. Pilcher writes: as they "are supplied from the two sources,—from the voluntary system by the portio dura, and from the ganglionic by the chorda tympani and the otic ganglion,—is it not probable that they may be of a mixed character, acting involuntarily when the acoustic nerve is over-excited, or when the mind is otherwise engaged, and attention not directed to the protection of the membrane and of the ear in general; and being influenced by volition, when the individual is desirous to increase or to diminish his mental perceptions?" Mr. Toynbee, who has lately written an ingenious article upon the subject (see Note, page 313), says: "I think it may be fairly inferred, that the function of the tensor tympani muscles is to protect the membrana tympani and the labyrinth from injury during loud sounds; while the stapedius muscle places these structures in a position to be impressed by the most delicate vibrations; and it would appear to be brought into action during the process of listening."

The Vidian nerve, after leaving the portio dura near its exit from the aqueduct of Fallopius, enters the tympanum, where it

receives the name of chorda tympani, by a special opening behind the posterior margin of the tympanic groove, and forming an arch close to the roof of the cavity, runs to the canal beside the fissure of Glasser; passing in this course between the handle of the malleus in front and the long process of the incus behind. In explanation of the peculiar tortuous course of this most remarkable nerve, and its final association with the gustatory, submaxillary, and dental supply, Professor Harrison says:—"This connexion, also, so close to the tympanum, which contains the ossicula and musculi auditus, may be designed to impart the twofold properties of sensation and of motion to this apparatus, through the filaments which connect the portio dura subsequently to the tympanic plexus: thus the organ of hearing, like that of vision, will be furnished with the three sets of nerves, one for special sense, one for sensation, and one for motion." (Dublin Dissector.) A familiar example of one of the phenomena resulting from the course of this curious nerve is, that of having the teeth "set on edge" on hearing the filing of a saw, or any other similar grating sound.

The mastoid cells are so irregular both in size, number, and arrangement, that no special description of them can be given; those nearest the tympanum, one or two in particular, are the largest; in a pathological point of view, it is sufficient to know that they communicate freely with the cavitas tympani, and are lined by a continuation of its investing membrane; they also surround the floor as well as the posterior wall of the tympanum; and the former locality is frequently seen covered with small cells in the dried bone. One of the best methods of displaying the form and continuity of these cells is by a cast taken in type metal, when they resemble a bunch of grapes attached by the stalk to the portion filling the tympanum. Anatomists and physiologists have not yet offered an unobjectionable theory to account for the existence of the mastoid cells, which are only developed in adult life. The generally received opinion is, that they permit a greater degree of resonance in the cavity of the tympanum than would otherwise occur. It has been advanced that, by affording a greater amount of surface for the expansion of the mucous membrane of the tympanic cavity, like the Schneiderian

membrane in the ethmoid cells and frontal sinuses, they thereby increase the powers of hearing; but we have no warrant for believing that the membrane is endowed with that faculty. I am inclined to think that, independent of their mechanical use in affording lightness with stability to the mastoid process, they act as a diverticulum or reservoir for the air contained in the tympanic cavity; and their being placed nearly opposite the entrance of the Eustachian tube rather favours this idea. If there was not some such space in which air might be occasionally compressed, I believe the membrane would be ruptured in forcible expirations, —such as sneezing, coughing, or violently blowing the nose,—as well as sudden loud noises acting from without, much more frequently than usually occurs. And, when the membrane bursts during the progress of otitis (which generally occurs during a violent expiration), it must be remembered that the mastoid cells are either blocked up by the inflammatory process or filled with pus.

The Eustachian tube consists of an osseous and a cartilaginous portion; the average length of the former is about half an inch, in width it is about the eighth of an inch from above downwards, and not more than the tenth from before backwards, or from side to side. This tube is separated from the carotid canal by a very thin plate of bone. The membrano-cartilaginous portion is fully an inch long; it is attached to the notched irregular extremity of the osseous part in the petrous portion of the temporal bone, and also to the edge of the sphenoid. This is generally the narrowest part of the tube, and from thence in its downward and inward direction to its gutteral orifice in the pharynx it gradually enlarges, but more particularly at its lower extremity. It thus resembles a straight trumpet, the small enlargement of the mouth-piece being at the tympanum, and the larger bell-shaped extremity opening behind the posterior nares, with its lower margin a little below the floor of that aperture. Viewed in the recent state, by making a central vertical section through the base of the skull, mouth, and pharynx, the lower opening of the Eustachian tube presents an obliquely upright elliptical slit or fissure about half an inch long, with thick, round, and slightly prominent lips. Placed thus behind, and so much above the hard and soft palate,

it is manifest that the tonsils, even when enlarged, cannot press upon its partially open mouth without first coming in contact with the palate plate, and lifting upwards and backwards the velum, which, it is well known, never occurs. When the tonsils are in a state of chronic enlargement from hypertrophy of their follicles, thickening of their mucous membrane, and cheesy, calcareous, or other abnormal deposits within their structure,—they first project towards one another, and consequently encroach upon the size and shape of the isthmus faucium, then towards the cavity of the mouth, and afterwards into the bag of the pharynx. I have never seen nor heard of a preparation showing the greatest possible degree of enlargement of the tonsil, in which it pressed upon the trumpet-mouth of the Eustachian tube. Anatomists will, therefore, find it as difficult to believe that enlarged tonsils produce deafness as practical surgeons to believe that their removal can in any way relieve loss of hearing. Even in cases of cynanche tonsillaris, when so large a collection of matter forms in the gland that suffocation threatens, there is no deafness. When deafness coexists with enlarged tonsils, I believe it is produced by the thickening of the mucous membrane extending into the Eustachian tube, or into the tympanum. The direction of the Eustachian tube is forwards, inwards, and downwards, towards its fellow on the opposite side, so that if a line passing through the centre of each was prolonged, it would cross that of the other side at an acute angle about the middle of the palate bone. It is partially fixed by the hamular process and the levator palati muscle; and its connexions with the muscles of the pharynx must always render it liable to alteration in the acts of mastication, deglutition, coughing, sneezing, or yawning. It must not be supposed that the Eustachian is a tube always open, no more than the urethra; although provided with cartilage, its sides are, in the middle third of its course at least, usually in contact.

The great gastro-pulmonary mucous membrane, passing up over the nose and pharynx, is continued into the Eustachian tube, at the orifice of which it presents the same characters with that lining the mouth and throat, being highly vascular, and studded with numerous fine glands, which secrete a plentiful supply of the

usual fluid poured out from that structure; and we can, therefore, understand how affections of these membranes may, by continuity of surface, extend into the upper portion of the tube and middle ear. As the membrane advances towards the osseous part of the tube, where it becomes periosteal and fibro-mucous, its characters change: it is less red, presents fewer follicles, is remarkably fine; and the villi on its surface are supposed to possess that peculiar vibratory motion which Purkinjie and Valentin discovered some years ago. As it approaches the upper extremity of the tube it becomes still more pale and delicate until it enters the cavity of the tympanum, in the healthy normal state of which it is of such smoothness and tenacity as to be demonstrated with difficulty; yet in disease or by exposure, as every practical aural surgeon knows, it becomes in succession highly vascular, villous, thickened, infiltrated, pulpy, and even sarcomatous, bleeding freely, secreting mucus largely, sometimes pouring out pus in an incredibly short space of time, and throwing out fungous granulations, &c. In the cavity of the tympanum it spreads over every surface, and is reflected round the various bones, ligaments, muscles, and nerves, and over the membranes closing the external auditory and cochlear apertures; and also extends into the large series of mastoid cells; so that, like the superficies of the peritoneum, it presents, on a careful consideration and examination of the parts, a much more extensive surface than would, at a superficial glance, appear. In anatomical characters, as well as in pathological phenomena, the lining of the lachrymal passage has many points of analogy with the tympano-Eustachian mucous membrane, which those familiar with the structure, relations, and diseases of both will upon reflection perceive, and may in treatment follow out. In the normal state the lining of the tympanic cavity presents a smooth, dry, but polished surface, of a greyish-white colour, somewhat like the external aspect of the membrana tympani, but frequently presenting, as a *post-mortem* appearance, a slightly pinkish hue: being in a healthy state transparent, its colour must be that of the bone beneath. Like all mucous surfaces, it exhales moisture, but the quantity must be so slight, and the fluid so very fine, that it finds a ready outlet through the Eustachian tube. In the fœtus the mem-

brane is highly vascular and secretes mucus, which is often found filling up the tympanum. Perhaps the variety in the period of audition may depend upon the more or less rapid absorption or excretion through the Eustachian tube of this mucus; while its presence in the very early periods of life may be useful in protecting the internal ear and auditory nerve from the injurious influences of sound in their then delicate condition,—in the same manner as the closed eye-lids of cats and some other animals for the first eight or nine days after birth protect them from the injurious effects of light.

I have thought that the increase of the lower jaw at the period of the first dentition (the usual time when infants are first attracted by sounds), by its condyle pressing on the cavity which forms the lower boundary or floor of the tympanum, serving to enlarge it by pressing upwards and outwards the tympanic ring, and also by the development of the dental organs not only altering the position of the maxilla itself, but calling into action a hitherto but little employed set of muscles,—might so change the position and caliber of the inferior portion of the Eustachian tube as to afford a ready outlet for the contents of the tympanum. In support of this view, I may mention that, in many cases of partial deafness, as well as defective speech, and in some instances of stammering, there is not only a great delay in the usual hearing period at infancy, but a very peculiar formation of mouth. In many of those cases which I have examined, the palate plate was remarkably high and narrow behind the incisors, which, as well as several of the other teeth, were irregular, and had been slowly and with difficulty developed.*

This lining membrane of the middle ear is highly endowed with nerves from the fifth, the portio dura of the seventh, and the nervus anastomosis of Jacobson,—known as the tympanic plexus, formed between the Vidian, glosso-pharyngeal, twigs from the otic ganglion of Arnold, and the sympathetic,—which lies, as already stated, on the inner wall of the tympanum. In a healthy state I do not think this mucous lining is so exquisitely sensitive as the membrana tympani. The cavitas tympani is as largely supplied

* With respect to the period of audition, see the chapter on the Internal Ear, and also that on Deaf-dumbness.

with blood-vessels as the membrana tympani, already described and figured at page 216, and derived from nearly the same sources, — the stylo-mastoid from the posterior auricular, which enters through the hiatus of Fallopius, and branches from the temporal, internal maxillary, middle meningeal, and the internal carotid. The pathological conditions which the cavitas tympani presents in the dead subject are related at page 111; and the abnormal states of that space during life, and also the conditions of the middle ear and Eustachian tube, are exhibited in the Registry of Cases.

MALFORMATIONS OF THE CAVITAS TYMPANI AND EUSTACHIAN TUBE.

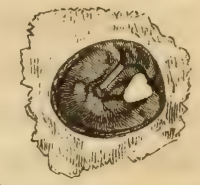
As modern anatomists have paid particular attention to the primitive formation of the cavity of the tympanum, many of the congenital malformations which it presents are explained upon the principle of arrest of development. As already stated, the cavity of the tympanum may be absent, its site consisting of solid bone; it has also been found much smaller than natural, showing a persistence of the characters observed during fœtal life. Its fenestræ are at times but rudimentary, closed by bony matter, or altogether absent; and the cavity has been found filled with morbid deposits. The ossicula are liable to great variety,—they may be altogether or partially deficient; when the stapes is wanting, ossified to the edge of the fenestra ovalis, or disconnected with the incus, considerable impairment of hearing must follow. But, in the great majority of instances in which malformations to any amount existed in the cavitas tympani or its contents, the subjects of such were either infants whose state of audition could not be learned, or persons congenitally deaf and dumb. I have already spoken of the irregularity which the malleus, as seen through the membrana tympani occasionally presents in some deaf mutes. The Eustachian tube has been found altogether wanting or partially impervious.

INJURIES OF THE TYMPANUM.

Considerable hemorrhage takes place from the ears, and pours out of the external meatus, not merely in cases of violent mechanical injury, and from the vicinity of loud or unexpected noises, as

already explained at page 222, but in cases of sudden death from strangulation and some other forms of asphyxia. Bleeding from the ears, as well as the nose, mouth, eyes, and genitals usually occurs in hanging as a public execution, but not always when it is suicidal. In such cases it is believed that the hemorrhages are the result of congestion; and if this be true, that from the ears must come from the meatus or from the tympanal cavity through a ruptured membrana tympani. Littre found the membrana tympani ruptured in a case of strangulation; but, as I already stated in two previous portions of this work, the source of the hemorrhage, and the cases in which it occurs, either as a constant or variable symptom, have not yet been fully investigated. A case has just occurred in this city, for the particulars of which, as well as the use of the preparation from which the accompanying illustration was made, I am much indebted to Professor Geoghegan. A female, aged 40, strangled herself, by twisting a ribbon round her neck, during the present month,—February, 1853. She was discovered by the police next morning, and Professor Geoghegan made a post-mortem examination of the body a few hours afterwards. The face and lips were of a dusky red, but unswollen, and blood poured out of the left meatus. It is sufficient for me to state the particulars of the examination as regards the ear, which was carefully removed. A section having been made through the internal ear, it exposed the cavity of the tympanum, which was found to contain a very little bright fluid blood, a trace of which had passed for some distance into the Eustachian tube; the mucous membrane of the cavity of the tympanum did not seem to be congested, but was partially stained with the blood which lay in it. The membrana tympani presented a mottled red and semitransparent appearance, the former being the result of blood extravasated upon its surface and between its laminæ. Towards its posterior attachment, a little behind and below the tubercle of the malleus, the membrane was red, and presented the triangular aperture shown in the accompanying representation; the anterior inferior angle of the aperture is nearly on a level with the end of the manubrium, and the posterior margin of the tri-

angle corresponds with the insertion of the membrane into the tympanic ring; but the rent does not run quite into it. Owing to the rupture of the radiating fibres—which are naturally feeble at this point,—the handle of the malleus is drawn somewhat forwards and upwards from its natural position. In the preparation, the chorda tympani nerve is plainly seen upon the inside bounding the upper angle of the aperture, which rather curves inwards towards the malleus, leaving a small portion of membrane above and behind it, while the posterior angle of the rent runs nearly into the tympanic ring. The tensor tympani muscle preserves its attachment to the malleus. The inner wall of the tympanic cavity having been, in great part, removed, as well as the other ossicula, I am unable to state what the condition of these parts was; but the section of the labyrinth does not exhibit any vascularity or extravasation, and all that portion of the mucous lining of the tympanic opening of the Eustachian tube, and as much of the cavitas tympani as remains, present no congestion or extravasation.



From an examination of this unique and most valuable specimen, two questions arise,—how did the rupture occur, and from whence did the hemorrhage come? By reference to page 139, as well as an examination of the Registry, given in chapter III., it will be seen that the aperture in the membrane has taken place in the second most usual locality,—viz., at the posterior margin of its attachment, behind the malleus, and immediately below and in front of the opening of the mastoid cells,—where a stream of air, if forcibly injected through the Eustachian tube, would chiefly impinge, particularly if the mastoid cells were already filled. That this jet of air would, when the membrane is in a high state of tension, produce the rupture, I have no doubt; but how caused during the death-struggle in strangulation, and with the mouth and nose open, I cannot explain. It is remarkable, however, that in this case the rent occurs in the precise locality where I described a cicatrix in the case of an artillery-man who had had hemorrhage from the ear. (See page 222.) With regard to the source of the hemorrhage, I am inclined to suppose that it came from the large branches of the stylo-mastoid artery which de-

scend along the handle of the malleus through the exact space traversed by the rent, as shown in the illustration at page 216. This being the case, we may suppose that the rupture was the original cause, and the hemorrhage a secondary consequence. The only two cases on record in which there has been a careful examination of the parts, is that by Littre and the foregoing.*

Bleeding occurs from the ears occasionally during violent paroxysms of hooping cough,—a fact corroborative of the belief, that the source of the hemorrhage is from a ruptured tympanal membrane. I believe sailors do not suffer from cannon-firing like artillery-men; this may arise from the floating substance on which they stand, and also from the muzzle of the gun being separated from them by the side of the ship.

Whenever the membrana tympani is pierced or ruptured by external violence, the cavity of the tympanum must be more or less injured, and the extent of mischief will much depend upon the nature of the penetrating instrument or foreign substance introduced; yet the results are not always what might be expected from the nature of the injury, as a piece of slate pencil may be driven into the tympanum, and inflammation and suppuration alone follow; whereas, a needle passing beyond the membrana tympani has caused death; and an irritating foreign substance is said to have induced epilepsy. Dr. Maclagan has recorded "the history of a case of epilepsy and deafness depending on the presence of a foreign body in the ear. The patient, when a boy about five years of age, had introduced into his ear what was supposed to be the seed of a sycamore. Unsuccessful attempts were made at the time to extract it. It remained in the ear four years without giving rise to any uneasiness, at which period the patient, then nearly ten years old, was seized with epilepsy of a marked character. Deafness, which had hitherto been slight, increased, and the epilepsy and deafness continued in an aggravated form for six years more, or ten years from the introduction of the fo-

* On the subject of hemorrhage from the ears, as a sign of certain forms of death, such as the foregoing instance, I would also refer my readers to the able tract, by Professor Geoghegan, "An Examination of the Medical Facts in the Case of the Queen *v.* W. B. Kirwan." Dublin: Fannin and Co. 1853.

reign body. It was at this period that Dr. Maclagan was consulted for the deafness; and he succeeded in removing from the ear the seed, surrounded by a nodule of wax sufficiently large to fill up the whole meatus. Under the ordinary treatment the deafness declined; and, since that period (then twenty years), he had no return of the epilepsy." Such is the record of this remarkable case, as communicated to the Edinburgh Medico-Chirurgical Society, and published in the Monthly Journal for February, 1841. Giving the author full credit for his implicit belief in the case, I must confess that I am inclined to bring in the Scotch verdict of "non proven," so far as the seed is concerned. The state of the ear, either before or after the removal of the foreign body, has not been recorded; nor whether the seed ruptured the membrana tympani, or caused any disorganization of the parts; neither was the cause of the deafness explained in any way. If the introduction of a foreign body into the meatus produces epilepsy, I believe it must be by irritating or pressing upon that highly sensitive portion of the meatus, to which I have already referred at pp. 77 and 189, and the slightest touch of which will, in some persons, induce violent spasmodic coughing, evidently from irritation of the larynx. Now, according to the recent discoveries of Dr. Marshall Hall, the immediate cause of epilepsy is, in many cases, spasm of the glottis; and I think it possible that such may have occurred in the instance just referred to.* Those observations which I made at page 178, upon the removal of foreign bodies from the meatus, are equally applicable to the present subject; and still greater caution should be observed with respect to the method of exploration, and the endeavours made to extract foreign substances without having such brought fairly into view. Cases have been recorded, both at home and abroad, in which violent efforts made by surgeons to remove extraneous bodies, *said* to have been introduced into the tympanum, have proved fatal. Nitric acid poured into the ear has caused death,† apparently from inflammation extending to the brain and its membranes through the meatus internus.

* I am much indebted to Dr. Douglas Maclagan for having, in addition to the above printed statement, placed his father's original MS. of the case at my disposal.

† See a case related by Dr. Morrison, of Newry, in the Dublin Journal of Medical Science for March, 1836.

Independently of all these injuries contingent upon violence applied directly to the ear, mischief of a much more serious nature may result from fracture of the base of the skull, or fissure passing through the petrous portion of the temporal bone, and, consequently, the middle and internal ear. In such a case, hemorrhage from the ear is one of the earliest symptoms; yet, of itself, it is not a proof of fracture, as it may arise from concussion, but it is presumptive evidence of the former. I have generally remarked the blood particularly thin and of a highly florid colour in these cases. Subsequently, in cases of fracture, a clear or pale straw-coloured fluid flows out of the ear in immense quantities, so as to saturate the bed on which the patient lies. My esteemed preceptor, the late Abraham Colles, who was justly considered an authority upon the subject of injuries of the head, and who, in the early period of his practice, enjoyed far more extensive opportunities for studying these affections than will, I am happy to say, ever be again afforded in this country,* entertained the opinion, and taught it in his lectures, that, when the patient lay upon the unaffected side, this serous fluid merely "welled up into the meatus," but never overflowed that cavity. Considerable discussion has arisen as to the cause and source of this fluid. By some it has been supposed, that it was the serosity of the effused blood pressed through a fissure in the bone; by others, that it came from the cavity of the cranium, and particularly the bag of the arachnoid; while many have held, that this flux is the liquor Cotunnii. The

* The amount of injuries of the head received into the Dublin hospitals sixty or seventy years ago was quite incredible; as, independent of the ordinary accidents which must occur in a large city, two special causes, neither of which now exist, then conduced to swell their numbers. Those who have read Dease's book upon Injuries of the Head cannot fail to have been struck with the circumstance that, in the cases of most of the males recorded, the injury inflicted was, "hit with a hanger," a short, heavy sword which the Dublin police and several of the tradespeople of that period carried, and which they appear to have used very freely. In the case of females, the violence was frequently caused by having fallen out of a window in the endeavour to reach the end of a stick which projected therefrom, like a bowsprit, with lines on each side, for the purpose of drying clothes. This contrivance may still be seen in some of the lanes and back streets of the Liberty. My father, who had been a pupil of Dease, and who had large opportunities of treating fractures of the cranium during the days of faction fights in Ireland, used to remark, that blood flowing from the ears, though a bad was not a fatal symptom, but the "welling up" of serum or clear fluid was always fatal.

subject was ably treated in the *Archives Générales* a few years ago by Messrs. Chaissaignac and Robert,* the latter of whom gives the following explanation of this occurrence:—"The dura mater becomes very thin where it lines the internal auditory canal, which it does closely, and is continued in the form of a sheath, over the facial, and the two branches of the auditory nerves, as they leave the cranium. The arachnoid accompanies the dura mater to the bottom of the internal auditory canal, and is then reflected upon the nerves of the seventh pair without adhering to them, as at the base of the brain itself. But the seventh pair does not nearly fill the canal, the space comprised between them and its walls is filled with cerebro-spinal fluid, which is known to be very abundant at the inferior and middle portions of the brain. It is evident, then, that, if the dura mater and the two contiguous folds of the arachnoid are ruptured at the base of the internal auditory canal, the cerebro-spinal fluid on the outside of the arachnoid, between it and the nerves, must escape freely by this rupture. We may conceive even that a rupture of the dura mater alone would be sufficient for the same effect, if this took place at the very bottom of the canal, at the point where the arachnoid abandons the surface of the dura mater to fold upon itself, and form the double serous sheath placed round the seventh pair, and the cerebro-spinal fluid immediately surrounding this. Once finding its way through the cerebral membranes, the liquid would easily get beyond the fine osseous plate which separates the bottom of the internal auditory canal from the vestibule, if this plate is fractured; from thence it would traverse the labyrinth, and reach the cavity of the tympanum, either through the fissure of the petrous portion, or through the fenestrum ovale itself, which is found open and free, in consequence of the displacement which the stapes has undergone. Lastly, from the cavity of the middle ear the liquid would flow freely outwards by the external auditory canal, through a rupture which always occurs in this case in the tympanum."

It is said that hearing has been preserved on the affected side

* See Numbers for November and December, 1845, with a careful *resumé* of the opinions of these gentlemen in Ranking's Half-yearly Abstract, vols. ii. and iii., from which latter work the foregoing extract is taken.

in some of these accidents, even after the stapes has been separated from the fenestra ovalis, and the fracture had passed through the walls of the labyrinth; but I think this assertion requires further proof. Notwithstanding the invariably fatal character of the foregoing symptom, a case has been related in which a portion of brain is said to have escaped through the ear, and the patient recovered. In severe dysuria, urine has been discharged from the ears. Hemorrhage may occur from the ear as the result of ulceration; and the carotid has been tied to arrest profuse bleeding from the ear, for which see the section on Otitis from scarlatina, page 340.

INFLAMMATIONS OF THE TYMPANUM.—ACUTE OTITIS.

The inflammatory affections of the middle ear are so well characterized in those of the membrana tympani, with which they are generally associated,—their symptoms have been so fully entered into,—and their treatment discussed at such length in the preceding portions of this work, that it is only necessary briefly to enumerate their different forms, to specify their peculiar symptoms and results, and to describe the best mode of treatment.

Acute otitis, or inflammation of the lining membrane of the cavitas tympani, is one of the most painful affections which can be suffered; and it is also at times one of the most fatal. It may occur at all periods of life, but is generally a disease of youth and middle age. It is usually induced by cold, or any of those exciting causes detailed under the head of severe myringitis,—like which disease, a sudden accession of pain in the middle or towards the end of the night is often the first warning which the patient receives. In many of those violent fits of screeching (occasionally attended with convulsions) with which children sometimes awake out of sleep, the true cause is otitis. The pain is described as of the most excruciating character, and likened "to that of a sword piercing through the ear into the brain;" and, although this extreme suffering intermits, it is only to be replaced by a dull, aching, and incessant throbbing in the ear, and pain and soreness often extending over the whole side of the head and down along the neck. The feeling usually complained of in these quiescent moments is that of a "bursting in the ear." There is occasionally

at the very commencement over-acute hearing ; but, in the progress of the disease, when mucus has accumulated in the cavity of the tympanum, audition is always impaired, and in a short time total deafness ensues. Pressure upon the palate opposite the guttural end of the Eustachian tube, or coughing, sneezing, blowing the nose, mastication, and even deglutition, increases the pain. There is also tinnitus present, which is generally of a low, humming character, but is sometimes compared to a " loud hammering." The physical signs are, a brownish-red colour of the membrana tympani, which is sometimes bulged into the meatus ; but the vascularity is seldom so florid or well marked as in myringitis ; if the meatus has been engaged, the external surface of the membrane is often whitish, presents a macerated look, and its epithelium appears to be peeling off. The patient cannot inflate the tympanum,— either owing to obstruction from inflammation extending through the Eustachian tube, or from the cavitas tympanum being filled with extraneous matter ; and the endeavour to do so increases the pain and sensation of bursting in the ear. In most cases of severe otitis, the external auditory conduit is also engaged, and the membrane of this passage is swollen and thickened, so as to intercept our view of the membrana tympani ; and the auricle itself frequently participates in the inflammatory action, and becomes swollen, œdematous, and of a livid colour. The mastoid process in the later stages of the disease (after it has continued some days) is generally tender to the touch, and its integument red and swollen. In such cases it should be carefully examined daily, according to the method recommended at page 56.

Facial paralysis, from extension of the inflammation to the bony canal in which the portio dura nerve passes round the tympanum, sometimes attends otitis, to which symptom, as a special affection, a section is devoted at page 346. The mucous membrane of the throat is often of a dusky red, and sometimes the submucous tissue infiltrated and swollen ; and, should the attack have originated in exposure to cold, it is often attended with increased mucous discharge from the nose, a stuffing in the frontal sinus, some suffusion of the conjunctiva, and also slight lachrymation.

In addition to these local symptoms, the patient labours under considerable fever; the tongue is white, dry, and often furred; the pulse quick and hard; the skin dry, the bowels constipated, the urine scanty and high-coloured; but there is not much thirst. There is extreme restlessness, and the countenance is always anxious, and highly indicative of the agony experienced. Intolerance of light is a frequent attendant, and delirium not an uncommon occurrence; and in aggravated cases, when the disease spreads to the internal ear and the contents of the cranium, there is generally a low moaning present, and not unfrequently a tossing of the head from side to side. When the head becomes engaged, the patient is often unwilling to answer questions, or to be disturbed in any way; is occasionally unconscious of surrounding objects; and does not at times even recognise his friends. I have sometimes seen partial coma present, from which, however, the patient could easily be roused; and convulsions occasionally occur, particularly in young subjects. In this stage it is often difficult for the practitioner in attendance to diagnose with accuracy the precise nature of the affection, or to say how much of it is purely local, and how much dependent upon cerebral irritation, or extension of the inflammation to the brain or its membranes. The cases detailed at pp. 238 and 247 are good examples of this form of disease, as well as its appropriate treatment. It must be borne in mind, that inflammations in the immediate neighbourhood of the brain often give rise to symptoms of a peculiar character, of which abscess in the orbit is an instance well known to surgeons.

The immediate terminations of the disease are threefold: first by resolution, in which the pain gradually lessens, the swelling subsides, and the hearing is in time restored, although the tinnitus, then generally of a buzzing character, usually remains for a long time after. In this case the inflammation either never proceeded to suppuration, or, if muco-purulent matter had accumulated within the tympanic cavity, it was absorbed, or it found a gradual exit through the Eustachian tube, leaving the lining of the middle ear thickened, and its functions consequently impaired.

In the second termination of the disease, the pent up matter having burst through the membrana tympani is discharged externally,

and relief is almost immediately experienced: thus showing, that the pain chiefly depended upon the unyielding nature of the structures bounding the space within which it was contained. The rupture generally occurs either opposite the opening of the Eustachian tube in the anterior vibrating portion of the membrane, or immediately adjoining its posterior attachment, behind and below the mastoid cells, as I have already explained at page 139. With the free communication which the largest of these cells has with the tympanic cavity, and the continuity of structure of their lining membrane with that originally engaged in the tympanum, it could scarcely be expected that a diffused inflammation, possibly of an erysipelatous character, extending over the mucous surface of the tympanum, would stop short at the mastoid cells, even if we did not possess facts, derived from morbid anatomy, to establish the contrary opinion. The very large quantity of purulent matter which escapes through the external meatus when the outer septum gives way, or, as the patient generally expresses it, "something bursts in the ear," and which amounts to two or three drachms at the moment, must have struck every one conversant with aural affections. Where does this come from, as it is much more than the tympanic cavity could have contained? I believe from the extensive surface of the mastoid cells. In this state the case becomes one of internal otorrhœa, the most frequent termination of acute otitis.

The third termination is always dangerous, and often fatal, and should make the surgeon be cautious and guarded in his prognosis. The inflammatory process, spreading from the tympanal cavity through the mastoid cells internally, or by the bony meatus to the periosteum covering the mastoid process externally, produces disease in that bone, to which, and the treatment required, I have already referred at pages 237 and 251. In such a condition the case is one of danger, but not to such an extent as that where the inflammation is propagated to the dura mater through the thin lamina of bone which separates it from the mastoid cells, or spreads by the way of the labyrinth to the internal meatus, and meningitis or cerebritis supervene. The lateral sinus may be the first part affected, but, generally speaking, the anterior or posterior surface

of the cranial aspect of the petrous portion of the temporal bone exhibit the principal evidence of disease, being either of a dark-red colour, or a greenish hue, or sometimes merely a slight purple tinge. Unhealthy pus at times forms between the dura mater and the bone; at others the inflammation extends to the brain, and abscess forms in the substance of that viscus; while in some other cases the inflammation is of a more diffused character, and effusions from all the extensive serous surfaces both of the meninges and the ventricles, as well as phlebitis of the lateral sinus, take place. The records of surgical and pathological science detail numbers of such cases, which are not, it must be remembered, the result of otorrhœa, but of acute inflammation of the middle ear, extending to the contents of the cranium, and ending fatally in a few days, or often less. The lower orders in this country are, from experience, well acquainted with the fatal nature of this malady. When compiling the Tables of deaths, under the Census Commission for 1841, my attention was attracted to the number of cases in which "died of a pain in the ear," or "was suddenly struck with a pain in the ear," was returned as a cause of death; and I find in the present Census inquiry that similar information, and to rather a greater extent, has been afforded. As many such cases have resulted from persons having fallen asleep in the open air, the popular belief attributes the disease to the entrance of insects or noxious animals into the ear, and in the case of young children who awake suddenly screaming in a most unearthly tone, and who are often seized with convulsions, and generally die comatose, the vulgar impression is, that they have been "taken by the fairies."* The Irish term for the disease, *Daigh cluaise*, "a darting pain through the ear," is expressive and characteristic.

By comparing the foregoing description with that previously given of myringitis, it will be seen that the two affections have, in their severest form, a number of symptoms in common, but

* Although these popular fancies and folks' lore are fast passing away, it is still of some importance that medical men, practising in the country, should be familiar with the opinions of the peasantry upon the subject, as well as the names of the diseases which they have to treat.

in that now under consideration, they are generally more aggravated; there is a greater feeling of fulness and bursting; the pain is of a more violent character, and the extent both of it and of soreness to the touch over the mastoid region and the side of the head, are, if closely attended to, sufficient to mark a differential diagnosis. The more frequent extension of the inflammation to the external auditory canal and the auricle, as well as the peculiar appearance of the membrana tympani itself, will still further assist in the formation of an opinion. But when the inflammation extends to the parietes or contents of the cranium, it is of great moment that the practitioner should be aware of every symptom superadded to those peculiar to the aural disease alone, even in the early stage of the affection, as, when coma, convulsions, or stertor ensue, the head symptoms are too well marked to render mistake possible; but the mischief has generally been done at that period, and treatment will avail little. I have seen delirium, apparently more the result of suffering than any interference with the sensorium, so frequently attend inflammation of the membrana tympani, and even the meatus, that I do not think it is of itself a pathognomonic of sufficient importance to lead to the belief that the brain is affected; but incoherence, or much hesitation and irregularity of answering, or of understanding what is said, is generally characteristic of cerebral disease. So is intolerance of light and contraction of the pupils, tossing of the head from side to side, and a feeling of weight as well as pain referred to the whole head. Vertigo is also a symptom deserving of attention.

In addition to the general expressions of pain, particularly during a paroxysm, there is a constant low moaning, highly characteristic of cerebral affections.* Rigors occur when abscesses are forming within the cranium, but do not usually attend suppuration of the ear itself, or of the eye or orbit. Dr. Graves, in the last edition of his Clinical Medicine, has called attention to the occurrence of rigors during fever, when detailing the case of a patient who, in addition to the usual symptoms of headach, hot skin, thirst, nausea, acceleration of pulse, and gastro-intestinal

* Dr. Graves relates a case of ear-ache in fever, in which the symptom of moaning was diagnostic of head disease. London Medical and Surgical Journal, vol iii., p. 103.

irritation, had a daily succession of slight and transient rigors. His words are:—" Now, whenever you meet with a symptom of this description in fever, be on your guard; watch the case with anxious, unremitting attention, and never omit making a careful examination. It is in this way that one of the worst complications of fever—treacherous and fatal disease of the brain—very often commences. On examining this girl, we found that she had not only headach but also acute pain referred to the left ear, the external meatus of which was observed to be hot and tender to the touch. In addition to this, we were informed by the nurse that she had been seized with a sudden fit of vomiting shortly after we left the ward on the day before. Here was an array of threatening symptoms calculated to awaken attention in any, even the most heedless, observer. A patient, after exposure to cold, is attacked with symptoms of fever; she has headach and restlessness; she then begins to complain of acute pain in the ear, darting inwardly towards the brain; and, finally, is seized with sudden vomiting. Under these circumstances, it is not difficult to form a diagnosis, and there can be little doubt but that the phenomena here presented were indicative of incipient inflammation of the membranes of the brain. It is not easy to say, whether in such cases the inflammatory affection of the membranes precedes the external otitis, or whether the inflammation commences in the external ear and spread inwards, though I am inclined to adopt the latter supposition, and the circumstance of the fever and ear-ache arising from cold seems to give an additional degree of probability to this view of the question" (vol. i. p. 191). Sickness of stomach, is not, however, a symptom I have often remarked in auro-cerebral inflammations.

Thus far do we observe the symptoms, and note the immediate terminations, of acute otitis; but even after the patient may have recovered from the second termination,—that by suppuration through the membrana tympani,—it cannot be said that he is safe, for chronic disease may go forward in the part, inflammation or caries of the bones may extend, and produce disease within the cranium at a more or less distant period.

With respect to treatment, that recommended in acute myrin-

titis, carried out to the fullest extent, is imperatively demanded. Leeches should be applied plentifully; two or three to a child, four or six in a young person; and from twelve to twenty in an adult; round the meatus, in front of the tragus, and behind the auricle over the mastoid process; and repeated by small relays from time to time, even in the course of the four-and-twenty hours. Mercury is even more necessary here than in cases of myringitis; it should be commenced at once, and with a twofold object: to arrest the disease in the ear, and should it fail in so doing, to check its inward progress to the brain. If we find the aural disease succumb to the depletion, mercury, and other means employed, we may hold back the mercury by lessening its quantity or increasing the interval between its doses, but not omitting its use altogether so long as any symptoms remain which might indicate extension of the disease. Blisters behind the ears, fomentations, and poultices, &c., as detailed in the former sections, may be called into requisition, according as they afford relief in each particular case. So soon as it can be determined that matter has formed under the periosteum, or that that structure itself, or the bone of the mastoid process beneath it, is deeply implicated in the inflammation, the surgeon should not hesitate to make a free incision, as I have recommended at page 237. Promptness and decision in this matter will often save a patient's life even in an advanced stage of the disease. It has been suggested to open the membrana tympani in order to give an early exit to the imprisoned fluid; and when it can be done with facility, and without injuring the parts beyond, I see no objection to the practice, although I myself have no experience of it. A difficulty, however, presents in the usually thickened and inflamed condition of the external meatus.

The case referred to at page 301 is also a good example of auro-cerebral inflammation.

SUBACUTE OTITIS.

Notwithstanding the severity of the symptoms in the foregoing disease, rupture of the tympanal cavity from inflammation of its mucous lining often takes place, with a much shorter and less painful form of disease, in which the patient says he was relieved

after a few hours' suffering by the "abscess in the ear having opened;" that ever since he has been very deaf; and that whenever he coughs or blows his nose, the air and discharge gurgles through his ear. Upon examination we generally find a rupture of the membrana tympani at its posterior margin, the meatus is often a good deal thickened, and the membrana tympani even more engaged in the inflammatory affection than in the former case. This increased morbid action in the membrana tympani, together with some ulceration of its mucous surface, may have led to the early rupture and evacuation of the contents of the tympanic cavity; the mastoid cells are seldom engaged in this form of the disease. We find an analogue to this affection in inflammation of the eye. In some cases of suppuration of the globe, or of matter contained in the anterior chamber, the cornea remains entire for several days, while in other cases of very much less amount of mischief, the cornea opens by ulceration, the contents of the chamber are evacuated, the pain ceases as soon as the tension is removed, and the eye recovers without further mischief, or but a slight adhesion between the iris and the corneal cicatrix.

The occurrence of *otorrhœa during the progress of phthisis*, must have attracted the attention both of the physician and the aural practitioner. In such cases I generally find the membrana tympani perforated, and a thin purulent discharge pouring out of the meatus, and also pumped through the aperture in the membrana tympani in considerable quantity. Upon inquiring into the history of the case, it will generally be found, that comparatively little pain was experienced, commensurate with the amount of injury done to the parts; deafness and discharge being often the first symptom which attracted the patient's attention. It is probable that in all these cases *subacute ulcerative inflammation* extended into the tympanal cavity through the Eustachian tube, and so thinned the membrana tympani that it gave way in a fit of coughing, without the patient being at all conscious of the occurrence at the moment. No hope of amendment can be held out in such cases, nor indeed should treatment be attempted, except that of keeping the parts cleansed, and using some very mild astringent lotion, or a weak solution of chloride of lime, which serves to

correct the fœtor sometimes, but not always, attending this form of otorrhœa.

In otitis, or inflammation of the tympanal cavity in any of its forms, whether violent or mild, lymph must be effused upon the surface of the membrane, as well as pus poured into the cavity, in the same way as we find lymph, pus, and serum in the bag of the pleura or the peritoneum; for I am inclined to think, that as soon as inflammation attacks the tympanic cavity, the Eustachian outlet is so much closed, that it becomes a shut sac, liable to all the phenomena attending inflammation in serous cavities. Hence those bands of adhesion passing between the sides of the cavity, as well as its contents, so often observed after death, and to which I have so frequently referred in the foregoing chapter, and which must produce collapse of the membrana tympani and impairment of hearing.

Exanthematous otitis, to which I have already referred at page 277, is manifestly an acute inflammation of the mucous lining of the tympanal cavity,—an extension of the same unhealthy affection so frequently seen in the throat of persons labouring under scarlatina and measles, &c., spreading upwards through the Eustachian tube, and which not only attacks the internal surface, but shows itself in the form of glandular swellings, diffuse inflammation, and purulent deposits in the neck. I must again repeat what I have already mentioned, that practitioners do not sufficiently attend to the state of the ear in scarlatina, and that they neglect the application of remedies for a disease which is, even in the unhealthy condition which the patient usually is at the moment, amenable to treatment, and the omission of which has, in numbers of instances, led to permanent deafness, and when the patient is young, to consequent muteism. That I am not overstating the case may be learned by any person who will examine the records of deaf and dumb institutions, or inquire into the causes of acquired muteism. Thus, from the latest authentic Continental Table—that published by the Belgian Government in 1847,* we learn that of 1892 cases of acquired muteism from all causes, 216 were from scarlatina, 80

* See Dr. Sauveur's investigations in the Chapter on Deaf-Dumbness, at the conclusion of this work.

from measles, and 28 from small-pox; from the American Tables, —out of 86 cases of non-congenital muteism, as many as 41 were from scarlatina ;*—and, according to the investigations in which I have been engaged under the present Census Commission in Ireland, I find that of 394 cases of specified causes of acquired muteism, in 35 instances it arose from scarlatina; in 12 from small-pox; and in 7 from measles; in all 54;† from exanthematous otitis, or 1 in 7·30 of the whole; and I am inclined to think, that this proportion is even less than what actually exists, for many cases were returned as "Diseases of the Ear," or a "Discharge from the Ear," acquired, no doubt, during some of those febrile diseases just specified. The most unmanageable cases of otorrhœa which I have met with in practice, those in which most destruction has taken place, and where the ossicula have been most frequently lost, have been the result of scarlatina or measles.

Life may be lost from exanthematous otitis, even as a secondary affection, of which a remarkable example is afforded by Professor Porter, in the first volume of Dr. Graves's Clinical Medicine, in which a boy had an attack of otitis while suffering from scarlatina; he recovered the latter affection, but had facial paralysis, with profuse otorrhœa, and was weak and emaciated. At the end of six weeks profuse hemorrhage burst from the external meatus; "the child had been asleep, when he suddenly awoke, screamed out 'Oh! my ear, my ear!' when almost instantly a gush of blood took place from the right ear. This blood was florid, and had the appearance of being arterial." Professor Porter, who was present during one of the attacks of hemorrhage, writes: "He seemed to have no previous warning whatever: sometimes the bleeding commenced during sleep, sometimes while he was amusing himself with his toys. He generally gave a single scream at the instant, and then the blood burst forth with a gush that really astonished me. I never saw blood lost so rapidly in any surgical operation I ever witnessed, and only once in an accident, where the deep jugular vein had been opened. This bleeding could hardly

* American Annals of the Deaf and Dumb, vol. i. No. 1, p. 31.

† See Report of the Irish Census Commissioners upon The Status of Disease, page 20; and also Chapter IX. of this work, on Deaf-Dumbness.

be controlled by pressure, and the attempt to do so caused intense pain, so that at times the nurse did not interfere, but allowed it to stop spontaneously, which it generally did in about a minute. About a week before his death, I observed that the blood was beginning to make its way by the Eustachian tube into the pharynx, some of which passed into the stomach, and some was expelled by the mouth, and then he bled sometimes by one passage, sometimes by the other, and occasionally by both. I need not say that he became pale, ex-sanguine, and exhausted, except to express surprise that any child of his age could have endured so long. The palate and inside of his mouth was as pale as any part of the external surface of his body. Exactly at the end of the thirteenth week from the commencement of his illness, he died after a slight gush of blood." There was no post-mortem examination, but the author believed, and with every reasonable probability, that the carotid artery had, by ulceration, opened into the Eustachian tube, where those two canals are only separated by a very thin septum of bone.

A case is related in the Edinburgh Monthly Journal, No. III., of a child eleven years of age, who had a severe attack of scarlatina, with suppurative otitis in both ears, from whose right ear a sudden discharge of blood occurred on the fifteenth day. The hemorrhage returned three times in great quantity during the six following days. Mr. Syme tied the carotid artery, which checked the bleeding, but the case terminated fatally on the eleventh day after the operation, apparently from cerebral disease. Upon examination it was discovered that the carotid was not concerned in the disease, but that the blood came from the lateral sinus, the bony septum between which and the cavity of the ear had ulcerated through at one point.

Of the *deafness from fever* I have already spoken at page 277, when describing the condition presented by the membrana tympani as the result of that affection; and the remarks there made are equally applicable here. That the effects of this disease are much more common than is generally supposed, may be learned from the Irish Census Returns already alluded to at page 340; for, of the 394 cases of acquired mutcism from specified causes, in 61 persons,

31 males, and 30 females, the disease was attributed to fever. Besides which, a number of cases of partial deafness, the result of fever, present daily at our public institutions. In a country where fever prevails so extensively, it is a matter of surprise that so few cases of muteism have resulted; and the circumstance can only be attributed to the fact of those attacked having been at the time of adult age, and who, consequently, never completely lost the power of speech, although many are partially deaf.

Another result of typhus fever is *dumbness*, one of the most notable cases of which has been related by Dr. Foley, of Kilrush. The following are the particulars:—A boy, aged 13, had a bad attack of typhus in 1839, and after a severe struggle recovered, but with paralysis of the right side and total loss of the power of speech; it was, however, believed that he was not deaf, as he could still hum tunes. He soon recovered from the paralysis, but remained dumb for eight years, when my attention was directed to the peculiarities of his case while engaged in making inquiries into the circumstances of the deaf and dumb under the present Census Commission. I communicated with Dr. Foley, who kindly afforded me many interesting particulars of the case, and also published the following additional account of it in one of the periodicals:—"During recent inquiries made about the case, I find that the patient continued completely dumb for the space of eight years, after which he and every member of his family were seized with typhus fever Towards the termination of the disease he was observed to articulate one or two short words at different times. As convalescence progressed, pains were taken to teach him a few more, and by very slow degrees, indeed, he was gradually brought on, so that now, at the end of three years, he can speak very distinctly, but at times so rapidly as to cause him great embarrassment. The intensity of the disease must have been much less in the last attack than the former, as in the first he was quite unconscious nearly from the commencement; while in the latter, he has stated to me, that he never lost his recollection. He has a perfect memory of every circumstance since his fever in 1839; was well aware of the privation under which he laboured, and therefore shunned intercourse with all except members of his own family.

He understood very well the jeers and observations made by those thoughtless young persons among whom he was often obliged to be; galling as they were to his feelings, he had no way to defend himself, and could not convey that he comprehended every word as well as any of them. I questioned him on different occurrences that took place since he had been my patient in 1839, and found that his memory on and acquaintance with them was quite accurate; so that I have no doubt of the correctness of his comprehension during the eight years of his dumbness. He told me that, since the original disease, he felt a 'weakness' in the right side of his body that never prevented his power of moving, but yet made him feel 'uncomfortable;' that, as the power of speech returned, the 'weakness' was diminishing, so that now he scarcely feels it. I stated in the original Report that he exhibited, during the fever, a very severe and well-marked paralysis of the right side, including every part from the eye to the toes; that on the nineteenth day it had nearly disappeared, and he was soon after able 'to run about.' There seems to be no doubt that the leading feature was meningeal engorgement, in the head at all events, and probably continued into the spinal canal. I think it probable that striæ of that congestion remained at the base of the skull, compressing some of the filaments composing the roots of the glosso-pharyngeal portion of the eighth nerve; as also of the ninth on the same side."*

In the same paper Dr. Foley has related a case of post-febrile deafness, in a boy about eight years old, and, as the defect of hearing is complete, he is gradually losing speech, and can now only pronounce a few words. I do not know the state of the ear in either case. I possess the histories of three cases in which females became dumb during parturition: they were also partially paralysed.

Sir Charles Bell has related a most interesting case of disease of the ear and loss of speech, which bears some affinity to that recorded by Dr. Foley, and of which the following is an abstract, nearly in the words of the narrator. A boy, aged 10, was seized

* See Medical Times and Gazette, for May 8, 1852. The original case appeared in the Dublin Medical Press of September 9, 1840.

with obstinate pain in his left ear, which, extending to his head, face, and teeth, gave him no rest day or night; he also then lost the sight of his right eye. He recovered from this attack apparently by a considerable discharge of pus from the ear, attended with intense pain, delirium, and convulsions. Sometime afterwards he had a second similar attack, remaining insensible for half an hour, and when he awoke to consciousness, "he was speechless." When brought under the care of Sir Charles Bell, he had a discharge from his ear, and was quite deaf, and the left arm was paralyzed; he could masticate and swallow with ease, and also protrude the tongue and turn it from side to side; but he was utterly unable to pronounce words. The consent of action between the chest, larynx, and mouth, seemed to be lost shortly after the foregoing note of his case. It was then reported that he was able to whistle, but, says the author, "on witnessing this attempt, we find that he makes a faint noise by drawing in his breath; and that, in fact, he cannot whistle." In this state he remained for six weeks longer, when we read that, "his efforts confirm the former statement, that he is incapable of putting the tongue and larynx into co-operation in speech. The mouth is shut, the tongue and larynx perfectly still, and he makes a noise by impelling the air against the posterior nares." Nine months after the time when he lost his speech, he recovered it in the following manner, as related by his mother:—"Three mornings ago he recovered his hearing and his power of speech at the same time. She had just been observing that he could not be very ill, since he was tumbling about, and throwing his heels over his head in bed. Soon after, his sister came running down stairs, saying, that her brother could speak, and a quantity of matter had come from his head into his mouth. From that moment he could hear, and with a painful degree of acuteness, the boy saying that the air rushed through his head. She describes his voice, too, as at first unnatural, and as if he spoke with difficulty; a circumstance which cannot surprise us, when we recollect that it is nine months since he could speak a word." Bell has appended the following remarks to this curious case. "There appears to have been an abscess, originally produced by disease of the temporal bone, and affecting the

nerves of the base of the brain, first affecting the fifth nerve, and then spreading its influence to the seventh and ninth. If the disease had produced its influence mechanically, and by pressure, there would have been no obscurity, and one side only would have been affected; but I imagine that the inflammation had disturbed the operations of the nerves, without altogether destroying their influence, deranging, for instance, the fine associations necessary to speech, without arresting the action of the muscles of the tongue. It is remarkable, that the bursting out of matter, probably from the Eustachian tube, had such an instantaneous and simultaneous effect in restoring both hearing and speech."*

Cases of congenital dumbness, without deafness, although rare, have now been fully authenticated; and a very remarkable instance of the sudden acquisition of speech is the celebrated case related by De Foe, of "The Dumb Philosopher, or, Great Britain's Wonder; containing: A faithful and very surprising account how Dickory Cronke, a tinner's son, in the county of Cornwall, was born dumb, and continued so for fifty-eight years; and how, some days before he died, he came to his speech; with memoirs of his life and the manner of his death."

The other circumstances relating to congenital muteism, will be found in the chapter upon Deaf-dumbness at the conclusion of this work. To my learned friend, Dr. Travers, I am indebted for the following reference to one of the ancient authorities upon deafness occurring during fever:—

"In reply to your note, inquiring about deafness as a symptom in typhus fever, I might give you references to a long series of authors from the earliest times, but the indistinctness of the characters given by many, indeed a majority, of the earlier writers, renders it often difficult to determine whether the disease they described is identical with the typhus of this country. It will, probably, be sufficient, *instar omnium*, to cite Hippocrates, who makes frequent mention of this symptom; but he mentions it as

* The Nervous System of the Human Body. By Charles Bell, F. R. S. London: 1830, p. cxviii. See also Dr Abercrombie's cases in the Edinburgh Medical and Surgical Journal for July, 1818.

occurring in both favourable and fatal cases: thus, in the third book of his Epidemics, he states it to have been persistent in the case of Hermocrates, who died on the twenty-seventh day of the fever (Hipp. Epidem., lib. III. § 1); while in the first book he had described it as occurring on the nineteenth night, in the case of Epicratis, who recovered (Ib. lib. I. § 3). He mentions it also in his Aphorisms, § IV. 28, 49, and 60 (with which compare Celsus, lib. II. capp. 6 and 8); also in his Coacæ Prænotiones, and in several places of his Prorrhetica, e. g., l. 4,—*κώφωσις ἐν ὀξέσι καὶ ταραχώδεσι παρακολουθουσα, κακον*· See also, in same book, § 12 and § 18. In the seventeenth century, and afterwards, you have Ettmuller, Van Swieten, and a host of others."

OTITIS WITH INFLAMMATION OF THE FACIAL NERVE.

Loss of motion of those parts of the face supplied by the portio dura of the seventh pair of nerves, and generally known as "Bell's Paralysis," is so frequent an affection, and its symptoms so well known, that it is unnecessary here to enter into a minute description of its character and appearance. Pressure on the nerve in any portion of its course, disease of the brain, caries of the temporal bone, or other organic lesions of a similar character, to be described under the head of Otorrhœa, are the causes most usually assigned for this affection. Occasionally, however, the physician or surgeon meets with cases of facial paralysis which had appeared suddenly and without any ostensible cause. Such cases are usually set down as the results of cold, and, generally speaking, the patient states that he had been exposed to a draft of cold air, opposite a broken window, an open door, or upon the top of a coach, &c., immediately before the disease appeared. It still remains to be proved, that the application of cold to the extremities of the nerve produces paralysis of the muscles to which it is distributed;—yet such has been the only mode of accounting for some of the cases of Bell's paralysis. It is true, that if we carefully examine the records of such cases, we shall find dulness of hearing, tinnitus aurium, and a slight pain in the ear, enumerated among the symptoms; but until I called attention to the subject some years ago, it was not believed that the paralysis was

produced by inflammation of the ear extending into the aqueduct of Fallopius. In my Essay upon the affections of the membrana tympani, I stated that I was "strongly inclined to think, that many of the cases of paralysis of the seventh pair of nerves, where we have no mechanical lesion, such as caries or exfoliation, and which heretofore were usually attributed to cold, &c., may have been caused by some form of otitis; and I would, therefore, beg to direct the special attention of physicians to the peculiar condition of the ear in all such instances;" and I then furnished some cases in proof of my opinion. Since that time I have had extensive opportunities for testing my belief; and I have not met with a single instance of Bell's paralysis unaccompanied by otorrhœa, caries, or cerebral affection, in which there was not manifest traces of disease, or its results, in the membrana tympani, or in the middle ear. Why the nerve should be affected in cases of very slight inflammation of the cavitas tympani and its external membrane, and not in those in which there is violent otitis extending to the periosteum and the mastoid cells, it is difficult to determine; neither can I offer any plausible reason for loud sudden noises producing such, as, for instance, in the case of Dr. Bloxham, of Portsmouth, related at page 222. The traget of the nerve around the tympanum is long and tortuous, and one only wonders why it is not more frequently affected. The following case affords a good example of this disease.

P. R., aged 35, suffered from typhus fever about fourteen years ago, during which he had violent pain in his left ear, accompanied by a discharge which has continued ever since. He is quite deaf upon this side, and upon examination the membrana tympani is found to be perforated at its anterior portion, and the whole membrane, auditory passage, and middle ear as far as can be seen through the aperture, are of a bright florid red; the ossicula, however, remain *in situ*.

The hearing in his right ear remained perfect until the beginning of May, 1847, when he began to perceive a deafness upon that side, which after a few days was accompanied by a most distressing noise resembling the "escape of steam;" he had also a rolling noise in his head, but no pain in either head or ear. He

sought medical advice, and had " drops" of an irritating nature poured into the meatus. Not having derived benefit from these, he applied at St. Mark's Hospital on the 29th of the month. The noise and deafness were as already described; in addition, he suffered from headach and pain in his face. The right side of the face was then completely paralyzed, presenting the usual appearance of fulness and smoothness; the mouth drawn to the left side, the eye staring from inability to close the lids, the tears flowing over upon the cheek, the nostril collapsed, the colour of the skin somewhat heightened, and its temperature considerably raised beyond that of the opposite side. The auditory canal was dry and red; the tympanal membrane had completely lost its polish, and presented an uniform pink appearance, not unlike blotting-paper. He had no pain anywhere around or about the ear, nor could pain or soreness be produced upon making pressure in any of the usual situations. He was able to inflate the tympanum; but could not hear the watch placed to the ear or any part of the head, and could with great difficulty distinguish the voice.

He was slightly mercurialized by the use of the hydrargyrum cum cretâ, with cicuta; leeches were applied several times round the meatus, and small blisters over the mastoid process. As soon as his mouth became sore (in about ten days), the hearing returned, so that he could hear ordinary conversation very well; the vascularity of the membrane lessened considerably, and the noise decreased. On the 15th of June the paralysis had quite disappeared; he was then obliged to discontinue his attendance at the hospital, but was given some of the iodine and hydriodate of potash solution to take occasionally. Wishing to learn the result of this case, I sent for the patient, and again examined him upon the 10th of September following. He had no return of the paralysis; the hearing remained much the same; the meatus was still red; the membrana tympani, over the head and handle of the malleus, was bright red; the rest of the membrane, with the exception of one clear spot in front of the point of the malleus, presented a dull, pearly hue; there was no collapse observable in it, but a very opaque rim, like a broad arcus senilis, surrounded its lower attachment.

If we take up Sir Charles Bell's great work on the Nervous System, already quoted from, we shall find several of the cases therein so graphically detailed confirming the foregoing views. Professor Roux, of Paris, in writing the history of his own attack of facial paralysis, says: "During the course of this complaint, I have experienced two circumstances which may lead to the detection of the facial nerve becoming affected:—1. The membrane of the tympanum was painfully sensible even to slight noises. 2. The sense of taste was affected in the right side of the tongue, so that everything tasted metallic. This last symptom has ever been a precursor of the complaint, being observed twenty-four hours before the occurrence of paralysis." The disease was attributed to rheumatism; but it is manifest that the inflammatory action commenced in the ear, affecting first the chorda tympani, and then the portio dura. The case of J. Richardson, No. 3, recorded at page 68 of Bell's book, is evidently one of acute otitis, producing facial paralysis;—Case No. 33 is of a like nature, but neither in it, nor in any of the other cases of facial paralysis detailed in that work, was any examination made of the membrana tympani or the middle ear.

Independently of the cases of well-marked facial paralysis, such as those detailed in the foregoing section, I have frequently observed a trivial affection of the nerve in connexion with aural disease, which had evidently commenced by inflammatory action in the tympanum, or its external membrane. In such cases, if we stand directly opposite the patient, while the face is in a state of rest, there is no twisting of the mouth, nor any paralytic condition of the eyelids, but the cheek looks slightly fuller than that upon the opposite side; and the ordinary wrinkle, or curved indentation, extending from the corner of the nose to a point a little external to the commissure of the lips, is either altogether deficient, or not so well marked as that upon the opposite side; and if we engage the patient in conversation so as to bring the muscles of expression into view, all the foregoing appearances become exaggerated. I have seen many such cases, where this symptom had not been observed by the patient or his friends, or his medical attendant.

Of the *rheumatic* and *gouty otitis* I have already written, and afforded a good example of the former at page 247, in the case of Mr. F., and this is a form of the disease not unusually attended with affections of the facial nerve.

CATARRHAL AND CHRONIC INFLAMMATIONS OF THE MIDDLE EAR.

Catarrhal inflammation, extending through the Eustachian tube into the middle ear, and producing muculent accumulation within that cavity, is a frequent disease, particularly of youth and early life. As it is generally, although not always, attended with symptoms of subacute inflammation in the membrana tympani, the characters of both diseases have so much in common, that I must refer the reader to the descriptions of subacute myringitis at page 253, and of strumous myringitis at page 268. A number of authors have written upon this affection under different appellations, such as,—chronic internal catarrh; catarrhal otitis; and, mucous accumulation in the cavity of the tympanum; Mr. Pilcher, as "the milder form of acute otitis interna;" and by Dr. Kramer, who has given a very good account of the disease, it is described under the head of "inflammation of the mucous membrane of the middle ear, with accumulation of mucus;" but, like most writers upon the subject, he has prefaced his observations by a lengthened dissertation upon Eustachian catheterism, and the introduction of gaseous and fluid injections, and catgut bougies, into the cavity of the tympanum.

The familiar instance of "a cold in the head," in which there is coryza; impairment of smell; stuffing of the nose and frontal sinuses; thickening and some increased redness of the faucial mucous membrane; a singing or buzzing in the ears; and partial deafness, relieved occasionally upon blowing the nose, coughing, or sneezing, when a feeling is experienced as if something "cracked or gave way" within the drum,—affords a good example of many of the phenomena attending one form of this disease. When it attacks young persons, or children at school, it is, as already mentioned at page 268, too frequently attributed to inattention, and time is allowed to pass by that might be advantageously employed with treatment; or the patient's friends excuse themselves by

saying they thought it was "only a cold."* In most instances, the disease spreads through the Eustachian tube, the membrane of which being thus closed, the free ingress of air to the tympanum is interrupted. There is generally a sensation of fulness in the ear, and the hearing distance is at first very variable, being always increased after each rush of air into the tympanum; but as the disease progresses, if not relieved by nature, or controlled by art, a general dulness, often mistaken in young persons for stupidity, remains. Upon applying the stethoscope, while the patient forces a stream of air into the cavitas tympani, by holding the nose, and making a forced expiration, or by the surgeon introducing a catheter, and employing the air-press, a gurgling or crackling sound is distinctly heard in that cavity, and very frequently it can be discerned within the mastoid cells also, showing that thin mucus has accumulated in these localities, no doubt poured out from the irritated and inflamed lining membrane. Pain is seldom complained of, but the mucous membrane of the throat is a degree redder than natural, although there is no soreness or uneasiness experienced in swallowing; but the uvula is almost invariably relaxed. If this latter organ be carefully examined in a number of cases, it will generally be found that there is little or no enlargement of its body or muscular portion, but that the elongation consists in a tag of the mucous envelope dependent from its extremity, between it and which there is often a distinct depression. The external glands of the throat are often enlarged.

Patients labouring under catarrhal inflammation of the ears are much influenced by the state of the atmosphere, or variations of temperature, being always worse in damp moist weather. The state of the external meatus and membrana tympani will be found upon inspection such as I have described under the head of Strumous Myringitis at page 268, to which section I would here refer the reader; but subacute or chronic inflammation of the mucous

* One of the truest and most graphic recitals of a case of neglected aural disease which I have met with is that of "The Deaf Playmate's Story," by Miss Martineau, in a Christmas brochure, styled "A Round of Stories," &c., conducted by Charles Dickens, and which I would strongly recommend to the perusal of parents, schoolmasters, and guardians.

lining of the tympanum is a constant attendant upon other forms of inflammation of its external septum. Neither in his description of the disease, nor in the details of cases, of which there are several, has Dr. Kramer given a very accurate account of the state of the membrana tympani in this disease; and several of the cases related by him afford no note of the state of this structure whatever; yet according to my experience, except in such slight cases as were merely the result of ordinary catarrh, I have always observed the membrana tympani in the early stage of the affection showing a delicate pink tinge upon its inner surface—evidently the inflamed mucous layer shining through; and occasionally presenting a posterior mottled opacity, like that seen upon the back of the cornea in aquo-capsulitis. The external surface of the membrane generally preserves its polish, and it is only as a secondary affection that its middle or external layers become thickened or opaque, which they generally do as the disease passes into a chronic stage. When we get the membrana tympani fairly within view, with a clear stream of sunlight passing down to it through a tubular speculum, and then desire the patient to force the air into the cavity of the tympanum, although at first sight we may not be able to recognise the pink tinge to which I have alluded, it will very soon become manifest, as the blood is forced into the structures surrounding the tympanal cavity. This tinge must not, however, be confounded with those distinct red vessels so often seen upon the surface, or between the laminæ of the membrane. Mr. T. W. Jones says, that "accumulation of wax in the auditory passage, and muculent obstruction of the middle ear, occur together" occasionally; I have not observed this symptom, but when epidemic catarrh and influenza prevail, and that mucous accumulations are common in the tympanum, I have, as already mentioned, frequently remarked an increased secretion of thin, pale-coloured cerumen accompanying such affections.

Catarrhal inflammation of the middle ear sometimes follows an attack of bronchitis, even although the patient may not have been exposed to any of the influences likely to excite aural disease at the time. Mucocele or subacute inflammation of the mucous lining of the lachrymal sac, with accumulation of thin, glairy

mucus, like white of egg, or of muco-purulent matter, or even pus, forms no inapt similitude to the affection of the ear now under consideration; and which, like the ophthalmic disease, is often induced by the same cause, occurs at the same period of life, and in similar constitutions, requires, in many respects, a like line of treatment, both local and general, and often terminates in the same manner,—the mucous accumulation within the tympanum occasionally ending in otitis, with ulceration or rupture of the membrana tympani and discharge of its contents externally, precisely as chronic mucocele, with partial hernia of the sac, may end in acute dacryocistis and fistula lachrymalis. In the progress of catarrhal inflammation of the middle ear, the inspissated mucus accumulates, while some of its more fluid portion passes down through the Eustachian tube; but, even supposing the latter canal to be obstructed by stricture, thickening of its lining membrane, or by impaction with mucus, there is no reason to suppose that the semifluid mass contained within the tympanum and mastoid cells may not be absorbed, in a healthy constitution, by the efforts of nature, or by judicious unmechanical treatment. That such occurs daily, and with just as much rapidity as it had been secreted, my experience of this disease leads me to believe. Take, for instance, a case of onyx, in which pus accumulates in the anterior chamber of the eye, so as almost, if not altogether, to fill it, do we not see that pus under judicious treatment absorbed in an incredibly short space of time? Do not the cavities of the pleura, the peritoneum, or the joints, absorb, as well as pour out, large quantities of morbid fluids? Is not empyema cured by absorption daily? Pending, however, the process of absorption, and as a consequence of the original catarrhal inflammation, the extensive mucous lining of the middle ear must become thickened and villous, in the same way as the delicately fine, smooth, polished, transparent, and intimately adhering conjunctiva, lining the cartilage of the upper eyelid, becomes villous and granular in the progress of catarrhal ophthalmia.

Chronic inflammation of the mucous lining of the middle ear and Eustachian tube follows as the ordinary consequence of the foregoing disease; and as the mucous layer of the membrana tympani becomes

more seriously affected, the other laminæ of that structure participate in the morbid action, and thickening and opacity follow. Such results may also be detected by examination, assisted by the history of the case, and by Eustachian catheterism when necessary or applicable,—we can also well imagine the amount of injury that must be inflicted upon all the parts covered by that mucous membrane, and in particular the mischief done to the fine nervous filaments of the tympanic plexus which ramify within and beneath it. The two following cases are fair examples of this disease.

Chronic inflammation of the tympanum, No. 1 in Registry. January 24, 1850.—G. S., a male, aged 20, with dark complexion, black hair, and brown eyes; a cook on board one of the Channel steamers, and, though not obliged to work the vessel, very much exposed to the effects of the weather. Has been partially deaf for fourteen years. Was treated at this Institution two years and a half ago, when, he says, his hearing was restored.

Right ear.—Hearing distance, eight inches. Does not suffer from pain or noise on either side; the auricle normal; the meatus natural in form, its surface smooth, white, and polished, but totally devoid of wax. This suppression of the natural secretion is, however, a consequence of the inflamed condition in which the external auditory passage has been for a number of weeks, months, or years. Upon bringing the tympanal membrane into view, by means of the tubular speculum, through which a stream of clear sunlight is transmitted, it is observed to be of a mottled red and white character. A large greyish-white spot occupies its upper and posterior margin; the membrane has lost its polish, is rough and irregular on its surface, and has become thickened throughout, like a cornea affected with dense leucoma: and the position of the manubrium of the malleus cannot be distinguished from the rest of the drum-head. By holding his nose, keeping his mouth shut, and making a forced expiration, the patient is unable to inflate the cavity of the tympanum, or press the membrane outwards, or even increase and give greater depth to the colour of its vascularity; showing not only that the air does not pass up freely through the Eustachian tube, but that the thickening and depositions in the membrana tympani have temporarily obliterated its vessels. Upon

applying the naked ear or the otoscope to this man's ear, and then making him perform the experiment which has been just described, we do not hear any of the usual sounds observed when the air gains access to the middle ear. He had for a long time a muco-purulent discharge from this ear, but of this he was relieved on his former application.

Left Ear.—Hearing distance, six inches. Auricle and meatus same as on right side. The characteristics of the membrana tympani are also somewhat the same, but on this side there is a greater amount of polish; there is a half ring or crescent of opacity, situated at the upper edge of the membrane. He can inflate the tympanum on this side, raise up the membrane or press it outwards, and render it more vascular,—proofs that the Eustachian tube is free. He had formerly a discharge from this ear also, but that ceased at the time of his former attendance. The membrane of the throat is natural. The tonsils are not enlarged. The end of the uvula was removed some years ago.

In this case we have a very well-marked example of inflammatory action going forward in the tympanal membrane, and, to some extent, in the membrane lining the external meatus also, the symptoms of which are observable by the eye; and we may fairly infer that it is not confined to these parts, but extends along the mucous lining of the middle ear down through the Eustachian tube, in the same way as we may justly pronounce upon the extent of inflammation throughout the internal structure of the eye in cases of choroido-iritis, or general ophthalmitis.

Treatment.—Counter-irritation behind the ears by blisters, applied as frequently as possible;—the twelfth of a grain of oxymuriate of mercury in bark taken three times a day.

February 13th.—He has very much improved since last examination. Hears at fifteen inches on right, and ten on left, side. Two days ago he heard a report in his right ear, immediately after which his hearing improved, owing to the air having found its way through the Eustachian tube, the previously thickened and inflamed membrane of which has probably resumed its natural character; but the hearing has varied several times since, as the passage became either blocked up by mucus, or its caliber decreased by the pulpy

infiltrated membrane. Upon bringing the right tympanal membrane into view to-day, we observe that it is of a mottled pink and white colour; he still cannot inflate it, and I am under the impression that it would be injurious to him to pass a catheter into the Eustachian tube, as some recommend, and through it force a quantity of cold air, or any fluid, even the most bland, into the cavity of the drum. It certainly would cause much irritation, and possibly increase the state of chronic inflammation we are labouring to subdue. If the urethra is in a state of inflammation or high irritation, or a man has an inflamed bladder, no practical surgeon pushes a catheter or a bougie into it. As the inflammation subsides, the passage will open without any mechanical means; the air, warmed and moistened by its passage through the lungs, or over the surface of the heated mucous membrane of the nose and mouth, will again, as it did a few days ago (perhaps in a fit of sneezing or coughing, as we have all experienced when labouring under a catarrh), gain access to the middle ear; the equilibrium of the tympanal membrane will be restored and hearing improved.

Left Side.—The membrana tympani is still slightly pinkish, but its polish is much improved, and there is a scaliness apparent on the surface of the meatus, which is always a promising indication. On desiring the patient to blow into his ears, as already described, a prolonged squeeling noise is heard on this side, showing that there is a perforation in the membrane, which, as soon as it takes place, always improves the hearing in cases like this. The opening can now be seen, not larger than a pin's head, with a valvular edge, which flaps up and down as the air is forced through. It has occurred since the last examination, about four days ago, and is situated where such ruptures usually take place,—in the lower and somewhat anterior portion of the membrana tympani, nearly opposite the opening of the Eustachian tube. A little thin mucus is pressed out along with the air through the opening. The aperture was touched with a fine camel's hair pencil, moistened with a ten-grain solution of the nitrate of silver. Two leeches were applied to the meatus, at its external aperture, and the counter-irritation behind and below the insertion of the auricle continued, tartar emetic ointment being substituted for blisters, and the

quantity of the bichloride of mercury and bark increased. His general health has much improved.

March 2nd.—This man states that he has recovered his hearing; that it is even better than it was prior to this last attack. Upon examination, the tympanal membranes are both of a greyish-white colour, with scarcely any vascularity remaining. The aperture upon the left side, which has been touched with a caustic solution twice a week since last report, has completely healed up.

No. 6 in Registry.—Chronic inflammation of both middle ears. —Exploration through the Eustachian tubes.

January, 1850.—J. R., aged 20, a seaman, has been deaf for some months past, and attributes his affection to a severe cold, caught by falling into the sea from the deck of a ship. He never felt pains in his ears prior to that time, and never experienced any deafness before; says he did not become deaf suddenly, but that his hearing was gradually impaired during the severe attack of cold under which he laboured at the time referred to; he gives, however, a very confused account of his symptoms, or the history of his case. Seamen seem to be particularly liable to diseases of the ear; but from their peculiar habits and want of education, they are bad subjects for examination. It will scarcely be credited, but it is nevertheless true, that several captains of merchantmen and colliers, trading to this port from other parts of the United Kingdom, are unable to write. This man says his deafness came on from cold, and possibly such was the case. Alterations of temperature, sudden or long-continued exposure to the effects of the weather, in a climate so variable as ours, are some of the most frequent causes of disease, particularly of the mucous membranes, and a common source of inflammation. Hence, perhaps, the great number of pulmonary diseases, the deaths from which swell the Bills of Mortality in England to such an extent. Yet one of the most common excuses made by deaf persons, upon being asked why they did not take advice sooner, is, "Oh! I did not think it would signify. I thought it was only a cold, particularly as I had the influenza at the same time." Yes, the cause was in all probability only a cold, or only the influenza, and both are very likely to accompany or be attended by diseases of the middle ear. During the

prevalence of influenza, deafness is not an uncommon symptom; the relaxation of, and over-secretion from, the mucous membrane of the throat, nose, and mouth, extending through the Eustachian tube into the middle ear.

Right Ear.—The meatus is natural in appearance, but remarkably long, and more tortuous than usual. The membrana tympani seems, therefore, to be deeper, or at a much greater distance than usual; it is thickened, opaque, collapsed, and the patient has not the power of inflating the drum and pressing the membrane outwards, on making a forced expiration. He cannot hear the watch on this side.

Left Ear.—Nearly the same peculiarities are observed as in the right. The membrana tympani is both thickened and opaque, but it still bears a reddish blush, in consequence of the inflammatory action yet lingering in it. He hears the ticking of the watch upon its being pressed against this ear, but is not conscious of any sound when it is placed between the teeth, or laid against the forehead. There is a hissing noise in both ears, and he states that he is occasionally conscious of a sudden report, as if a small pistol was fired within his ear.

As the tympanal membranes appear collapsed, and as the patient is unable to inflate the drum on either side by any effort upon his part, I am inclined to think that the Eustachian tubes are closed, or the cavities of the middle ear blocked up with mucous secretion.* The acute stage having already passed, and some months having elapsed since the original inflammation was excited, Eustachian catheterism was therefore resorted to. The sound heard in this man's ear was of a gurgling and crackling character, caused by the stream of air rushing through the mucous secretion, which had collected in the cavity of the drum. The patient himself says, he feels a great sound in his head, as if a trumpet was blowing something outwards in his ear.

The mucous sound at first heard has very much decreased, and has in some measure given place to the ordinary *thug*, succeeded by the prolonged *vibratory* sound, caused by the stream of

* The notes of these cases, it must be remembered, were taken from clinical lectures by a short-hand writer.

air reaching the membrana tympani without interruption. We observe that it raises up that part which is most vibratory, and placed opposite the jet of air, and also that it at the same time renders the upper and posterior part of the membrane highly vascular. The catheter was then introduced upon the left side, and nearly the same phenomena observed.

The patient was ordered to take three grains of chalk and mercury, with one of extract of hemlock three times a day, until its influence upon the constitution was manifested. Leeches were applied to the external auditory openings, and counter-irritation, by means of frequently repeated blisters, kept up behind the auricles.

Feb. 13th.—The mercury acted rather briskly upon this man, but apparently with a salutary effect. His hearing is now very much improved; upon the right side he can hear the watch at an inch distance, where before he was not conscious of the ticking, even when it was pressed against the meatus; and upon the left side he hears at two inches. Upon both sides, the external auditory passage is dry and scaly, as if covered over with an herpetic eruption,—a very common appearance in this locality upon the subsidence of an inflammatory attack. The tympanal membrane is still pinkish upon both sides; but it appears somewhat less dense and white since the time when first examined. The singing noise still remains, but is not so distressing. This patient stated, that he had to go to sea next day; and he has not been seen at the Institution since.

As a consequence of either catarrhal or chronic inflammation of the middle ear, thickening of the mucous membrane, contraction in the caliber of the Eustachian tube, or an accumulation of inspissated mucus in the tympanum, may result. For the relief of these morbid changes catheterism of the Eustachian tube, and the forcible injection of a stream of medicated air or water, have been recommended, and are by some persons extensively practised; but, should these means prove ineffectual, we are told in books, as already alluded to at page 74, to introduce a catgut bougie through the Eustachian tube into the middle ear, in order to break up the plug of inspissated mucus. It is scarcely necessary, in the pre-

sent state of medicine, to criticise this most unjustifiable practice. With respect to gaseous or aeriform injections, they are, to say the least of them, generally innocuous, and may sometimes prove beneficial, not merely as diagnostics, but by giving a healthy action to the diseased mucous surface. It is in this way that I believe the medicated air-douche acts in certain forms of disease of the ears, erroneously described as "nervous deafness," not by stimulating the proper nerve of hearing, which it cannot reach,—and even if it could, we have no warrant or analogy to lead us to suppose that it could effect any such influence,—but by improving the condition of the mucous lining of the tympanal cavity. It is also in this way that I believe the use of tobacco-smoke, already described at page 259, proves efficacious, especially in cases complicated with relaxation and some chronic thickening of the mucous membrane of the throat. When the mucous râle remains after the ordinary means for subduing inflammation and improving the general health have been resorted to, and that the air-douche has proved ineffectual in removing mucous accumulation in the middle ear, it has been recommended in books, and is still practised by aurists, to wash out the tympanum with injections of warm water, by means of a common syringe fitted to the Eustachian catheter held in the nose by the patient or the operator. I have a doubt as to whether such fluids so applied ever reach the tympanic cavity in the majority of instances where they are used; but I have no doubt that, in a large majority of cases of catarrhal or chronic inflammation of the middle ear, mechanical interference is highly objectionable. How, then, are we to treat this insidious, frequent, and most injurious affection? A recent author says, "venesection is too frequently neglected in this affection"! but I do not think any judicious surgeon in the present day will take out his lancet and open a vein at the bend of the elbow when applied to by a patient seeking relief for catarrhal or chronic inflammation of the middle ear, no more than he would for ordinary catarrh or influenza, chronic ophthalmia, or any similar painless disease in which the strength of the patient requires support, and the general condition of the constitution indicates the use of tonics. Slight local depletion, repeated from day to day, by means of a few leeches

applied on the external meatus in the early stage of the disease, the use of counter-irritation, by means of blisters, over the mastoid process, and subsequently painting that part with strong tincture of iodine; the use of astringent gargles, particularly of the preparations of alum, so long as the throat exhibits symptoms of disease, will be found most efficacious. I believe the act of gargling is in itself highly beneficial, I presume by the way in which it acts, through the muscles of the pharynx and palate, upon the Eustachian tube. The application of a strong solution of nitrate of silver to the throat, as described at page 271, every second or third day, considerably assists in the treatment. I am inclined to think that its action is not confined to the part to which it is applied, but that it exercises a beneficial influence upon remote portions of the same structure, even the mucous lining of the middle ear. There is generally derangement of the digestive organs accompanying these affections: the tongue is usually flabby, white, and its edge indented with the teeth; the bowels are irregular; the patient complains of acid eructations in the morning; the face is pale, the skin cold, the spirits depressed, and the patient altogether in that condition denominated "dyspeptic." This is, I presume, the form of disease described by some writers as "stomach deafness;" and in such cases the state of the digestive organs demands attention: but if we confine our treatment to the removal of the dyspeptic symptoms, without employing such local means as I have described, we shall be allowing valuable time to pass by, and when we have exhausted an extensive range of treatment in "setting the stomach to rights," we shall find the aural disease no better than when we began. In other cases the general health appears to be unimpaired.

The general treatment, consisting chiefly of gentle alteratives and tonics, such as I have recommended in cases of subacute and strumous myringitis, referred to at the commencement of this section, are equally applicable in the present case. In some females the murated tincture of iron, given in combination with the bichloride of mercury, is more beneficial than in any other form of aural disease. I have not found the hydriodate of potash as useful in this disease as when the fibrous structures of the ear are affected. It is, upon the whole, an uncertain remedy; and, although it occa-

sionally makes what is called "a hit," it very frequently disagrees with the stomach; and, by producing iodization, it rather increases the relaxation and humidity of the mucous surface, which it is intended to benefit. In children and young persons, the iodide of iron, given in the form of syrup, is generally beneficial, and may be continued for a long time. Where aperients are acquired, small doses of blue-pill, the watery extract of aloes, and taraxacum, will be found a useful combination. A dry, warm atmosphere is not only most agreeable to the patient's feelings, but materially improves the condition of the ear. When the membrana tympani exhibits evidence of thickening or opacity, it should be treated with nitrate of silver, as I have already explained.

DISEASES OF THE MASTOID PROCESS AND OSSICULA.

As the otitis, from whatever cause it may have arisen, increases in intensity, or extends in duration, the neighbouring parts become affected; periosteal inflammation denudes the margin of the auditory process, spreads over the surface of the mastoid region, and caries and exfoliation of the mastoid process not unfrequently follows at some period, more or less remote, but generally during the progress of the subsequent otorrhœa. When periostitis of the mastoid process can be detected, it should be treated with promptness, as I have already directed at page 237.

Whether *inflammation of the mastoid cells* ever exists as an idiopathic affection, and not by extension of morbid action from the cavity of the tympanum, I cannot say, never having myself met with such a case; but that they become secondarily affected is well known. Fine and delicate as the membrane lining these cells is in a state of health, I have seen it, in cases of chronic disease, of a livid red, thickened, and even so pulpy as completely to fill up the smaller compartments, and to bulge out of the cells on making a section of the mastoid process. Such is precisely the appearance in a dissection now lying before me, and the history of which will be found in the chapter on Otorrhœa. The mastoid cells have likewise been found filled with cheesy deposit, also with quantities of scrofulous matter, and with true tuberculous deposit. The whole process has been found so soft, that it could be cut

with a knife. Fistulous communications, opening from the mastoid cells externally, are by no means uncommon in neglected cases of otorrhœa; and exfoliation of a thin scale of bone, immediately behind the attachment of the auricle, often follows acute otitis, especially in those cases in which a free incision having been made to relieve the inflamed periosteum, the progress of the disease has been checked. In neglected cases, particularly in young children, the whole mastoid process not unfrequently comes away.

Artificial perforation of the mastoid process, for the purpose of throwing injections into the middle ear, or to relieve deafness in cases where the Eustachian tube has been completely closed, an operation to which I have already adverted at page 19, has long since been exploded, not only as ineffectual, but positively hazardous.

Diseases of the ossicula are, I believe, much more frequent than surgeons are aware of; we have, however, acquired but little knowledge on the subject, except that derived from dissection, or in cases of otorrhœa attended with destruction of the membrana tympani, in which some of these ear bones have been discharged. They are liable to all the affections to which bone is subject—ulceration, absorption, caries, and anchylosis, as already described at page 111. Anchylosis of the stapes is said to be of common occurrence. They may be also dislocated one from another, or totally disconnected, and they have been found within the mastoid cells, or even in the vestibule. Injuries of the tympanal cavity must affect these little bones just as seriously as the same amount of violence done to any of the other bones or joints of the human body.

Morbid growths and deposits of various kinds have been discovered *in the cavity of the tympanum.* When in a state of chronic inflammation, and exposed to the action of the air, as in cases of otorrhœa with perforation or destruction of the membrana tympani; the mucous lining is always thickened, highly vascular, and pulpy, not inaptly resembling the surface of a well-injected fœtal stomach; and we must suppose, that it presents in a modified form something of the same condition in cases of otitis, or in those

catarrhal affections attended with muculent accumulation. Unhealthy granulations and polypoid growths spring from it, but not so frequently as from the external meatus. Exostosis has been noticed by observers, of which I have given an instance at page 206; but, independent of such isolated bony growths, the whole osseous walls of the tympanum have been found upon dissection thickened, and when caries has affected them, large portions have been thrown off by exfoliation. In fact, when once disease seizes upon the parietes of the middle ear, it is impossible to say what amount of mischief it may not effect.

MALIGNANT FUNGUS.

In the section devoted to diseases of the external meatus, I gave the history of two cases of malignant disease of the ears, both of which ended fatally in a remarkably short space of time. The following case was of a more chronic nature, although it eventually proved equally fatal with the two former, related at pages 206 and 208; and I have placed it among diseases of the middle ear, because it did not, like them, appear to commence by a polypous growth in the meatus, but sprouted from the mastoid process directly. The gentleman who was the subject of this frightful disease was a native of Scotland, and, when I saw him, a fœtid fungous mass occupied the entire of the mastoid or post-aural region, which was considerably enlarged, particularly from before backwards. Large portions of it occasionally sloughed, especially at the inferior part, and considerable hemorrhage ensued on each occasion. The auricle was elongated, and dragged downwards by the fungous mass, a portion of which protruded through the external meatus; there was complete paralysis of the parts supplied by the facial nerve on the right side. The patient, a man about 55, stated that he had suffered from otorrhœa for several years previously; that the present disease was of nine or ten months' duration; and that the tumour first appeared behind his ear. He also said that he had had it twice removed by a surgeon in Glasgow, and that he had lately consulted Professor Syme, who most wisely advised

him not to allow it to be interfered with further. When he consulted me he was suffering from violent pain in the head, and vertigo, and was greatly emaciated, so that I suppose his sufferings did not last much longer. He returned to Scotland a few days after I saw him.

DISEASES OF THE EUSTACHIAN TUBE.

Were we to put implicit faith in the writings of authors, or to quote authorities upon diseases of the Eustachian tube, we should be led to believe that the affections of that portion of the middle ear are of common occurrence; with, however, the exception of subacute inflammation, thickening of the mucous membrane, and consequent closure, more or less complete, temporary, or permanent, of the tympano-faucial canal, as described in several of the foregoing portions of this work,—I think that disease of that portion of the auditory apparatus is neither itself frequent nor a usual cause of deafness. Furthermore, it remains to be proved, that an impervious condition of this canal is, as generally supposed, a cause of deafness. Every form of inflammation of the mucous membrane of the throat may, and often does, by continuity of surface, extend into the Eustachian tube; and, as I have already stated, it is through it that that most severe form of otitis, derived from scarlatina, extends into the tympanic cavity; but this is no new doctrine, it was known to Hippocrates, who said that, in quinsy of the fauces, the patient became deaf by closure of the Eustachian tube. That, however, the most extensive throat disease may not affect the Eustachian canal, or in any way impair hearing, I have an instance at this moment before me, in which a gentleman, under treatment for another affection, presents the peculiarity of complete occlusion of the naso-pharyngeal opening, owing to adhesion of the velum palati to the back and sides of the pharynx, the result of syphilitic ulceration. There is no vestige of uvula remaining, and examination with a small mirror does not show any aperture whatever throughout the whole length of the cicatrix. The patient's hearing is most acute.

Syringitis, or inflammation of the Eustachian tube, may exist as an isolated affection; but I know no symptoms, except those

detailed at page 350, and which are common to it and catarrhal otitis, by which it may be recognised. In all cases of aural disease the condition of the Eustachian tube, so far as permeability is concerned, should be tested by the means pointed out at page 64. Yet, it must be borne in mind, that many persons possess good hearing who are not able to press air into the tympanum by holding the nose between the finger and thumb, keeping the mouth shut, and then making a forced expiration; and many persons there are who can only occasionally, and that with difficulty, force air through the Eustachian tube on one side; yet they can hear equally well on both sides. If the patient cannot inflate the drum by this means, we should resort to the use of the catheter and air douche, as already described at page 66. Should the operation fail, and that the surgeon is *perfectly sure* that the deafness arises from occlusion of the Eustachian tube, by inspissated mucus or stricture, and that the membrana tympani and middle ear are free from disease, he may, having previously introduced the catheter into the guttural orifice of the tube, carefully and cautiously pass a fine, flexible bougie through it into the remaining portion of the canal up to, but, if possible, not into, the tympanal cavity. Whalebone stilettes and catgut bougies have been recommended as the best means for effecting this end; but, as I have already stated at page 74, the only instrument which I ever pass through the Eustachian tube is a fine ivory bougie, from which the earthy portion has been removed by means of an acid, and the end of which, when previously moistened for some time, becomes soft and pliable, yet possesses more resistance than catgut. In many cases of puriform discharge from the ear, in which the greater portion of the membrana tympani had been removed, I have noticed that the Eustachian tube was not free; and Saunders observed the same, and relates a case in which, upon dissection, the canal was found impervious. In such instances, I presume that the occlusion occurred either at the time of the original otitis which produced the otorrhœa, or subsequently, by extension of the chronic inflammation and hypertrophy of the mucous membrane to that lining the Eustachian canal. Stricture of the Eustachian tube is not only exceedingly rare, but, says Mr. T. W.

Jones, "when it exists, is in no case the sole cause of the deafness; and it would be of no use to subject the patient to the distress attending attempts at dilatation, even if success in the object could be calculated on. It is sometimes found, as already mentioned, that it is in the duller ear the Eustachian tube is pervious! and that, when impervious Eustachian tubes are rendered free, so that the access of air to the tympanic cavities is again permitted, this is not always followed by any amelioration of the deafness."

I would refer those who may desire to be acquainted with the literature of Eustachian diseases, to Lincke's work, in which he has described, besides inflammation of the lining of the canal, dilatation, stricture, obstruction, collapse, obliteration, and imperforation of that portion of the auditory apparatus.

We have not on record a sufficient number of post-mortem examinations of the Eustachian tube throughout the whole extent of that canal, to be able to speak with any degree of certainty as to the proportion of cases in which stricture or other morbid appearances present. It has, however, been found impacted with mucus, its lining membrane thickened, crossed by bands of adhesion; the sides of its guttural orifice adherent, apparently from ulcerations, and a large portion of the canal occluded; but strictures, such as those which occur in the male urethra, have not been described. One of the most recent dissections of this part in which disease was discovered, is that by Mr. Toynbee, in the case of a person aged 45, who died of phthisis. Twenty years previously he suffered from otitis, which ended in confirmed otorrhœa in the right ear; and, when examined a few days before his death, it was observed that the membrana tympani on that side was absent, and the lining of the tympanic cavity presented the thickened condition usual in such cases. Upon the left side, in which the patient had suffered from painless deafness for some years, the membrana tympani was as white as writing-paper, and partially dull upon its surface. The condition of the Eustachian tube was not inquired into, the patient being in a debilitated state. Upon inspection after death, the tympanic cavity and mastoid cells upon the left side were found filled with mucus; the state of the Eus-

tachian tube is given as follows:*—"The internal portion, for the length of half an inch, was healthy; but, at about that distance from the cavity of the tympanum, there was a sudden constriction, and for the length of about a line and a half, the tube was so contracted that, even when its anterior wall was removed, it was with difficulty that an ordinary-sized bristle could be introduced into the opening. This stricture resulted from the external and internal walls of the tube pressing against each other, the small space still permeable being above the upper part. The most remote cause of the stricture, however, would appear to have been an enlargement of portions of the bone constituting the external and internal osseous walls of the tube. The external osseous wall was at this part twice its natural thickness, and somewhat rough; while the internal wall was forced outwards by the dilatation of the carotid canal, which, thus pressing upon the cartilaginous portion of the Eustachian tube, with which it was in contact, produced a flattening of the natural concavity of the internal wall. The mucous membrane lining the Eustachian tube was in a natural state." The author states that "the existence of this stricture would have been detected during life had the Eustachian catheter and otoscope been resorted to;" but that strong presumptive evidence of its existence might be afforded by the peculiar opacity of the membrana tympani, for that, with the exception of mucous accumulations, arising from thickening of the mucous lining of the tympanic cavity, he "did not know of any disease which produces the peculiar whiteness in the membrana tympani." Notwithstanding his usual perspicuity, the author has not mentioned, with the exception of the opacity of the membrana tympani, by what method of diagnosis the stricture would have been discovered, or how distinguished from ordinary temporary occlusion, arising from thickening of its mucous lining, or complete stoppage, by means of a piece of inspissated mucus, and the white papery appearance of the membrana tympani is common to nearly all cases in which

* See Monthly Journal of Medical Science for August, 1850. The wood-cut attached to the description of the case referred to is not sufficiently distinct.

inflammation attacks any of its layers, or morbid deposits occur within or upon it. In such a case as the foregoing, the only hope of amendment would be from perforation of the membrana tympani, as detailed at page 293.

Of the history of Eustachian catheterism, and the part which British surgeons have taken in the progress of that operation, I have already spoken fully in the Introductory Chapter of this work. The rather novel doctrine of the Eustachian tube remaining closed, except during the act of deglutition, has lately been propounded by Mr. Toynbee.

Foreign bodies have been found in the Eustachian tube;—the most remarkable case on record is that in which an ear of barley was discovered after death projecting from its guttural orifice.

Cleft palate may, it is said, produce deafness, owing to the partial closure of the Eustachian tube from the side of the divided soft palate lying up against it; and not a little, I should think, from the deficiency of resistance in the inferior attachment of the levator palati muscle, allowing the lower portion of the walls of the Eustachian tube to fall together. I lately examined two cases of cleft palate in young females: in both instances the fissure extended anteriorly into the hard palate; both were partially deaf. In the case in which there was most hardness of hearing, the membrana tympani, on both sides, was thickened, opaque, and partially vascular, and the patient suffered occasional pain in the ears, increased on catching cold; and she had also tinnitus aurium. In the other case, in which the patient was least deaf, there was no disease apparent in the parts submitted to inspection.

THROAT DEAFNESS.

Of *deafness arising from disease of the throat*, or said to be caused by enlarged tonsils, or elongated uvula, I have already expressed my opinion (see pp. 34, 36). The profession may, however, be told, that neither anatomy, physiology, pathology, nor even reason and common sense, can stand in competition with facts. Now, here is a fact supplied by Mr. Yearsley, the great supporter of the tonsillitic form of deafness:—

"Enlarged tonsils producing *deafness* and thick speech.—An

eminent physician intrusted his son to my care. The hearing was extremely imperfect, the voice thick and nasal, and the articulation so indistinct as to be almost unintelligible to strangers. The tonsils were permanently enlarged, and the mucous membrane generally was in a state of chronic inflammation. The most approved medical and topical treatment had failed in affording relief. The protruding portion of the left tonsil was excised, after which every symptom gradually subsided."

In that case the negative certainly counterbalanced the positive signs.

In reply to Mr. Yearsley's doctrine, Mr. Harvey, in his book on the subject referred to in page 36, states, that " extirpation of the tonsil in the young has led to pernicious results,—such as giving rise to bronchial and pulmonary disease, with other mischiefs to be mentioned in this work; and, notwithstanding high authorities in favour of extirpating the tonsils or uvula, for the relief of deafness, the operation has almost uniformly proved a failure."

But, without bandying opinions or citing authorities on this subject, I appeal to every practical physician and surgeon, as to whether patients with chronic enlargement of the tonsils are more prone to deafness than other persons with similar constitutional tendencies.

Wishing to investigate the subject on a large scale, I lately applied to Drs. Mayne and Kirkpatrick, physicians to the Dublin Workhouses, for an opportunity of examining the tonsils of any cases which might offer among the numerous children and young persons under their care; and they have informed me, that chronic enlargement of the tonsils is almost unknown among the pauper poor and the lower orders: and they attribute the enlargement of these glands, seen in the middle and upper ranks of life, to high feeding.

Polypus of the nose does not cause deafness when of the ordinary gelatinous kind; but I have seen deafness induced by a large fleshy polypus which passed down into the pharynx.

CHAPTER VII.

DISEASES OF THE INTERNAL EAR.

Anatomy of the Osseous Labyrinth.—The Cochlea, Vestibule, and Semicircular Canals.—The Membraneous Labyrinth.—The Seventh Pair of Nerves.—The Auditory Nerve.—Congenital Malformations of the Internal Ear.—Wounds and Injuries.—Inflammations: Internal Otitis; Otorrhœa.—Caries.—Malignant Growths.—Tinnitus.—Otalgia.—Hypercusis.—Nervous Deafness: Its Diagnosis, Symptoms, and Treatment.—The Opinions of Kramer and Schmalz.—The Medicated Air-Douche.—The Ether Cure.

THE middle ear or labyrinth contains the ear-bulb or true sentient apparatus of hearing, to which all the other portions are accessory. The osseous labyrinth is situated in the petrous portion of the temporal bone, near its cerebral surface, and between the meatus auditorius internus, for the transmission of the auditory nerve and the internal wall of the tympanic cavity, with which space it communicates by the round and oval apertures already described under the head of the Anatomy of the Cavitas Tympani. This bony case, in which the membranous labyrinth and the terminal expansion of the auditory nerve, with its surrounding fluid, is situated, is divided into three compartments, distinguished as the cochlea, the semicircular canals, and the vestibule. This latter space communicates with the two former, and also with the tympanum through the foramen ovalis, which, in the recent state, is closed by the end of the stapes and its surrounding membrane and ligaments. For wise purposes in the animal economy, this osseous labyrinth is curiously fashioned out of the densely hard, solid bone, and can only be studied with effect upon elaborately carved preparations, or in casts made of metal, run into the bony tubes, spires, and chambers of which it is composed. As, however, it is never the seat of surgical operation, and cannot be examined during life, the relative situations and proportions of its parts are of less practical importance to the surgeon than either of those portions of the ear already described.

The vestibule, a small, irregular chamber, varying in size in

different individuals, but averaging about the one-sixth of an inch in its longest diameter, is situated immediately behind the foramen ovalis; it has three dilatations, called ventricles or horns,—a superior and two inferior; one before and the others behind. Its inner wall consists of the sieve-like plate which separates it from the internal meatus auditorius, and through which pass the filaments of the portio mollis and some blood-vessels. Anatomists have described with great minuteness each hole, elevation, or depression in this portion of the internal ear, the enumeration of which, in a practical work of this description, would be out of place.

The semicircular canals are three tubes, each somewhat more than the half of an irregular circle, which exist in the temporal bone, toward the upper and posterior side of the vestibule, into which they open by both extremities; but, as two of them have a common aperture, there are but five openings from these tubes into that chamber. Two of these canals have their arches turned upwards, and hence their position is described as vertical,—the one superior, the other posterior; the third, or shortest, is horizontal.

The cochlea, so called from its resemblance to a snail-shell, lies contiguous to the vestibule, and rather in front of the tympanum. It is a conical tube, above an inch and a half long, closed at the distal extremity, and making two turns and a half round a central pillar,—the axis or modiolus; its direction is from left to right in the right ear, and from right to left in that upon the opposite side. The first turn of the tube of the cochlea produces that bulging upon the inner wall of the tympanum already described as the promontory. Around the axis or modiolus a thin plate of bone winds like the thread of a screw,—the lamina spiralis, the shelf formed by which is, in the recent state, completed by membrane, and thus the passage is divided by this spiral septum into two scalæ. The superior, or external, or vestibular scala, opens into the vestibule; the larger, or scala tympani, which is inferior and internal, opens into the cavity of the tympanum by the fenestra rotunda. These two divisions of the cochlea formed by the spiral lamina communicate at the extremity, in consequence of that bony shelf separating from the axis and turning outward, so as to present a hook-like termination.

Two delicate canals likewise exist in this portion of the petrous bone,—the aqueduct of the cochlea,—a mere venous conduit,—which extends from that tube, near the fenestra rotunda, to the margin of the jugular fossa; and the aqueduct of the vestibule, which leads from the posterior wall of that cavity, near the common opening of the two semicircular canals, to the upper surface of the petrous bone, a little behind the internal meatus, where it is lined by a reflection of dura mater.

In the recent state, the whole extent of the osseous labyrinth is lined by a fine fibro-serous membrane, which is intimately adherent to its surface, extends into the aqueducts, completes by a double layer the spiral septum of the cochlea already alluded to, forms the inner lamina of the membrane of the fenestra rotunda, and also covers the base of the stapes at the fenestra ovalis. Its external surface acts as a periosteum, and its internal secretes the perilymph or liquor Cotunnii. This fluid permeates the entire labyrinth, passing by the heliocotrema or that passage which exists round the top of the modiolus, and thus completes the circuit between the stapes at the fenestra ovalis, and the tympanic cavity at the fenestra rotunda.

Occupying two portions of the osseous labyrinth, and to a certain degree supported by the perilymph, we find a membrano-nervous texture, called the membranous labyrinth, which is the fundamental or true essential portion of the organ of hearing. It is composed of a small bag, denominated the common or vestibular sinus, which sends tubuli through the semicircular canals, and is in contact with its osseous surrounding walls only where the latter are pierced by those nervous filaments which ramify within it; but it does not enter the cochlea.

The labyrinth receives its vascular supply from arteries derived from the basilar, and sometimes the cerebellar, which enter by the internal auditory foramen.

The seventh pair of nerves, having arrived at the meatus auditorius internus, divides into the portio mollis or the auditory, and the portio dura or facial. The latter, separating from the former, enters the aqueduct of Fallopius, which leads forwards and outwards to the hiatus Fallopii, where it enlarges into the form of

a ganglion. Its subsequent course, around the roof and posterior wall of the tympanum to the stylo-mastoid foramen, has been already described. The portio mollis divides in the meatus auditorius externus into two branches, which are separated by a bony ridge: the large anterior one proceeding to the cochlea; the lesser posterior branch having its destination in the vestibule and semicircular canals, and being chiefly distributed upon the membranous labyrinth, and in the enlargements denominated ampullæ, at the commencement of the membranous tubes of the semicircular canals. The anterior branch or nerve of the cochlea proceeds to the base of the axis, and, dividing into a number of delicate filaments which pass through the substance of that stem of bone, are distributed between the osseous plates of the laminæ spiralis, at the edge of which they terminate, by a very free anastomosis, in minute fibrillæ, and finally end in delicate papillæ in the membranous portion of the spiral laminæ.

MALFORMATIONS OF THE INTERNAL EAR.

Congenital malformations of the labyrinth have received much attention, and minute dissections of such are accumulating from year to year; but as yet pathologists have not been able to connect the peculiar deficiencies in hearing with the post-mortem appearances observed. The entire labyrinth has been found one undivided cavity, without a vestige of either cochlea, vestibule, or semicircular canals, and not having any communication with the tympanum. In other cases the labyrinth has been altogether deficient, and there was, consequently, a total absence of the essential parts of the organ of hearing. The fenestræ are sometimes deficient, or their membranes ossified. The osseous labyrinth has been found but imperfectly developed, so that the membraneous labyrinth was partially uncovered. The cochlea occasionally forms but one turn and a half; and has also been found in a mere rudimentary state, presenting an irregular *cul de sac*, without any axis or spiral. The semicircular canals are, however, the portion of the internal ear most frequently found malformed; they have been observed smaller than natural, altogether wanting, partially impervious, or only two out of the three existing. The aqueducts have

been found preternaturally large, particularly that of the vestibule, which, in each instance detailed, contained likewise an unusual quantity of fluid, apparently the perilymph. The labyrinthine cavity has been seen filled with a substance resembling cheese; it is said, that the perilymph or labyrinthine fluid has been found deficient or altered in quantity, but this statement requires confirmation. Finally, the auditory nerve itself has been found weak, atrophied, or altogether wanting. In all the foregoing instances of deviation from the normal state, the subjects of them have been born deaf, and, consequently, remained dumb. For further information on this subject, the reader is referred to the concluding chapter, on Deaf-Dumbness.*

WOUNDS AND INJURIES OF THE LABYRINTH.

Of fractures passing through the internal ear and their results, I have already given a description at page 328, so that it is unnecessary here to recapitulate that portion of the subject. Injuries of the internal ear can only be produced by great violence applied to the skull, or from some small, sharp, penetrating instrument passing through the tympanum into the labyrinth, by either of its two external apertures. Cases of this kind must, consequently, be very rare. One very remarkable instance occurred in the practice of M. Speranza, of Parma, which has gone the round of the journals, and been copied into most of the works upon aural surgery. It is that of a man, aged 20, into whose ear a sharp needle was thrust: he screamed violently on the instant, and immediately fell down senseless. Shortly afterwards he became delirious, was then seized with violent convulsions, and died on the fourth day after the accident. On examination, the membrana tympani was found lacerated, and the cavity of the tympanum filled with pus, the chorda tympani nerve was divided, and the ossicula displaced; the

* See "A Contribution to the Pathology of Congenital Deafness, by Edward Cock," in Guy's Hospital Reports, No. VII., October, 1838; also, the article, "Ear and Hearing, Diseases of," in Cyclopædia of Practical Surgery, by Mr. T. Wharton Jones; Cases recorded by Messrs. Toynbee, Dalrymple, Thurnham, and Mondini; the works of Schmalz, Kramer, Tod, Saissy, Caswall, Swan, Lincke, Deleau, Itard, Pilcher, Frank, Yearsley, Williams, Scott, Schallgruber, Murer, Mücke, Bochdalek, Wright, and others; and the various books upon Diseases of the Ear and on Deaf-Dumbness;—and several dissections detailed in British and Continental Medical Works and Periodicals.

fenestra ovalis was open and apparently lacerated, and fragments of the stapes were found driven into the vestibule: so that it is manifest the needle passed into the labyrinth through that aperture. The membrane lining the labyrinth was found much injected, and the auditory nerve in a disorganized state. The membranes of the brain exhibited all the symptoms of inflammation, and that portion of the encephalon in contact with the temporal bone was filled with blood, and blood was also extravasated between the dura mater and the petrous bone.

The subsequent injury done to the parts, from inflammation following violence must be very great, but as yet we have not a sufficient number of well-authenticated cases on record to define with accuracy what are the precise symptoms of inflammation of the internal ear, distinct from inflammation of the cavitas tympani arising either from injury, or idiopathically as the result of cold, scarlatina, or any other special cause. They may, however, be inferred from the greater severity, both local and general, of the characters of otitis already described, particularly those alluded to at page 333, as the third termination of that disease. In fact, we cannot well have otitis accompanied by high fever, and attended with cerebral symptoms, without the structures of the internal ear being engaged. When otorrhœa extends to the cavity of the tympanum, it is, as I have already so frequently stated, not only difficult to limit the action of the chronic inflammation which keeps it up, but hard to say where it may end. Whether inflammation arises spontaneously in the labyrinth, without the tympanum or mastoid cells being previously engaged, is, I should say, very doubtful; but when, from ulceration during the progress of otorrhœa, the stapes has been removed, or the membrane of the fenestra rotunda destroyed, we can well imagine how easily disease may extend to the lining membrane of the labyrinth, and finally to the bone itself.

Caries.—I am indebted to Sir Philip Crampton for an examination of one of the most extraordinary pathological dissections of diseased bone perhaps in existence, consisting of the entire internal ear, cochlea, vestibulum, and semicircular canals, with a small portion of the inner wall of the tympanum, which he drew

forth from the meatus of a young lady who, after the most urgent symptoms of inflammation of the brain, with paralysis of the face, arm, and leg, and total deafness of one side, recovered from the head symptoms and the paralysis of the extremities after a copious discharge of matter from the ear. This discharge, the paralysis of the face, and deafness, continued some time, accompanied by occasional attacks of pain in the ear, till one day Sir Philip, perceiving a portion of loose bone lying deep in the cavity of the meatus, drew forth the specimen from which the accompanying illustration has been made. In this, it does not appear that the hard external enamel of the bone was affected, but the scala cochlea is far more beautifully displayed than could possibly have been done by art. Here it would seem that caries was the original disease; but in the great majority of instances it is the secondary affection consequent on neglected otorrhœa, a knowledge of which fact should impress upon us the necessity of carefully examining into, and, if possible, removing aural discharges in any stage of their course.



Malignant growths from the ear have been already described at pp. 206, 208, and 364. In one instance the disease appeared in the form of a polypous growth proceeding from the meatus, and, for the reasons described at page 207, probably extending from without inwards. In the case related at page 364, the disease burst through the mastoid process, and appeared to have its seat in the cells of that bone. "The fungi of the dura mater," says Mr. T. W. Jones, "which so readily destroy the bones, and make their way into all their openings, sometimes get into the tympanum, and from thence appear at the auditory passage." Cases of malignant fungus of the ear have likewise been related by Mr. Travers and Mr. Wishart.* In the dissection of the case recorded by the latter, it was found that a part of the squamous portion of the temporal bone had been absorbed, and that a piece of the tumour, the size of a small egg, had passed through it into the cranium, and pressed upon the brain. Tubercular deposits† have been

* Travers, in the Lancet; Wishart, in the Edinburgh Medical and Surgical Journal, vol. vii., 1811.

† See a case related by Chomel, in Medical Gazette, vol. xx., p. 284.

found in the ear, and also in connexion with the auditory nerve, of which a case occurred in the practice of M. Chomel.

Osteosarcoma has likewise been known to engage both the internal and middle ears, but it has not been observed to commence originally in either of these cavities.

Of *tinnitus aurium* I have already written at page 82, to which section I would here refer the reader. It is but a symptom; yet it is one that should be carefully attended to, especially in cases where we do not find a sufficient amount of organic change in the ear to account for it in any way. In such cases, it behoves the practitioner to institute such strict inquiries as may determine whether the noise experienced is the result of any local affection, head disease, or derangement of some distant organ. This can only be determined by a careful examination; and although the proofs derived from such may be of a negative character, they are, nevertheless, highly valuable. I am at this moment acquainted with more than one case for which I was consulted years ago on account of "noises in the head," and "singing in the ears," in which there was no apparent aural disease, and little or no loss of hearing, the subjects of which I have since seen tottering through the streets hemiplegic, or with that form of senile paralysis, probably from softening of the brain, in which the knees and hips are bent, and the patient slips along the flagway, becoming prematurely "the lean and slippered pantaloon," bending at every step, and dragging, if one may so say, his legs after him. In some other cases of tinnitus, unaccounted for by aural disease, for which I have been consulted, I have subsequently heard of the patient's death from apoplexy or paralysis.

The existence of *Otalgia*, or neuralgic pain in the ear, of a non-inflammatory character, and not caused by pressure, or lesion of any description, has been questioned by writers on aural surgery; and, on the other hand, has been rather too implicitly believed and prescribed for by the general body of the profession. So far as my own experience extends, I am compelled to admit its existence, but it is a rare, a very rare, form of disease. We can only diagnose it by a careful inspection and examination of all the parts susceptible of such inquiry, aided by the history of the case and the general appearance

of the patient. In each of the three cases which I can at this moment call to mind, as having been affected with true otalgia, they were all young females, two of them highly hysterical, and the third suffering from uterine derangement. The pain in the ear was described as of a most excruciating character; it only, however, lasted a certain length of time; it was of an intermittent character, and generally came on about the same period in the four-and-twenty hours, resembling, in many respects, brow-ague, and those neuralgic pains which often affect the eyeball in young persons. Upon examination, there was no trace of inflammation in the meatus, membrana tympani, or the cavity of the tympanum; and these negative proofs, together with the periodic return of the pain, the total freedom from annoyance during the intervals, and the absence of all cerebral symptoms, are, I believe, the only sure diagnostics of nervous pain in the ear.

In one of the cases which came under my notice, there likewise existed an intense degree of exaltation of hearing, which lasted for many weeks, but was most acute during the paroxysm of pain, when the slightest noise was intolerable. In that instance the sound of the knives and forks at dinner appeared, more than all other noises, to produce a paroxysm of *Hypercusis*. I have likewise seen this affection, which is analogous to photophobia, or intolerance of light, which so frequently accompanies ocular and cerebral diseases, unattended by either otalgia or otitis; it is also, as every practical physician is aware, a symptom of fever and other diseases of the nervous sytsem. In some forms of hysteria, and in cases of mental aberration and lunacy—as those familiar with such know full well—the patients often complain of all manner of noises, whisperings, and unnatural sounds; but these are, I believe, generally the result of a disordered imagination, like those ocular spectra which afflict certain individuals. But, even independent of such cases as the foregoing, there are persons who cannot bear particular noises, owing to some peculiar idiosyncrasy,—like those alluded to by Shakespeare, who could not contain themselves when "the bagpipe sings i' the nose." How far such affections depend on disease of the auditory nerve, or a morbid condition of the chorda tympani, I cannot say.

The treatment of otalgia must, to a certain degree, depend upon the character and constitution of the patient; but all those cases which I have treated gave way in time to tonics and change of air. Of the former, the preparations of bark and iron are the most efficacious; large doses of quinine, in conjunction with black drop, aromatic spirits of ammonia, and camphor, will often succeed in warding off an attack; and when once the periodicity of the disease has been disturbed, it generally becomes amenable to treatment. I have also found the citrate of quinine and iron very useful in such cases.

NERVOUS DEAFNESS.

Having, throughout the previous portion of this work, and in various other writings, laboured to show that the great mass of diseases of the ear, producing impairment of hearing, are the result of inflammation in some of its many Protean characters, I cannot be expected to have much to advance upon the subject of what is called *Nervous Deafness*, or impaired functional power of the auditory nerve, irrespective of organic disease in the brain, or structural alterations of the textures of the organ of hearing. That there are many cases of deafness, with or without tinnitus, which do not exhibit, during any period of their course, the slightest change from the normal condition, in those parts of the ear susceptible of examination; in which the Eustachian tubes are free; where the mucous lining of the tympanic cavities is, so far as our means of inquiry extend, healthy; in which the membrana tympani is perfectly natural both in structure and position, and the external meatus does not show any symptom of disease,—every one who treats aural affections upon a large scale must admit. But, that they are as frequent, or bear that proportion to the other diseases of the ear which some authors would lead us to believe, is, I think, a most erroneous and untenable position, not borne out by fact, and not warranted by analogy with the diseases of other organs, especially those of the eye. Paralysis, so called, of the portio mollis of the seventh pair of nerves, one would think, from reading books, or hearing professional men pronounce opinions on the subject—was a very common affection; I believe, however, that hereto-

fore it has been used, like the term "scrofula," as a cloak for ignorance or inability of making an accurate diagnosis. The surgeon, having made up his mind, from a careful examination of the physical signs, both positive and negative, and also the history of the case, that it arises from impaired function of the auditory nerve: has next to determine whether the seat of the disease be in the expansion of the nerve within the labyrinth: at its origin in the brain, or in some portion of its course within the cranium,—either from pressure arising from tumours and other mechanical causes, congestion, softening, atrophy, or any of the many diseases to which the encephalon is liable at all periods of life. As I have already stated at page 378, with regard to tinnitus, so in respect of chronic deafness not characterized or accompanied by any trace of morbid lesion in the ear, have I seen the person so affected, in process of time, longer or shorter as the case might be, show symptoms of cerebro-spinal disease, in like manner as complete amaurosis with dilated pupil is often the forerunner of apoplexy, paralysis, or epilepsy, &c. Such cases, in which the deafness is but a premonitory symptom, are, however, comparatively few; yet I have known some instances in which the patient went to bed in perfect health, and on awaking was totally deaf, and never heard afterwards. Fright has likewise suddenly deprived young persons of hearing. Such cases are generally incurable.

Cophosis, or total deafness, coming on gradually, and unaccompanied by any symptom but noise in the ear, is a much less frequent affection than total blindness produced by amaurosis. For the most part, the persons affected with nervous deafness, even in the severest form, can be made to hear through the medium of an ear trumpet. Still, if we judge from the expression of their own feelings and their countenances, we are led to believe that their privation is much greater than those completely deprived of sight. There is—with the exception of some few instances with which I am acquainted, in which infirmity has not biassed natural amiability—a restless anxiety depicted in the countenance of the partially deaf, and a suspicious look, which is never observed in the blind, who, even when left alone, generally wear a smiling countenance, as if pleased with their own reflections. A greater amount

of sympathy is generally awarded to the blind, who are more dependent upon others for their comforts and amusements. They it must, however, be remembered, suffer simply from their privation; the deaf, in addition, often labour under the most harassing noises, and, from partially hearing what is said, without being able to understand the purport of general conversation, and being, moreover, much confused by the Babel of sounds around them, should claim more sympathy than is generally awarded them. Those who have completely lost the power of catching anything said in conversation, and who can only be communicated with by a trumpet,—generally hearing but the good and pleasant things of life,—are in a much happier condition than the former. It is, in all probability, owing to the confused noises with which the deaf are troubled, and to the belief which many of them entertain, that people are speaking about them, when they do not hear what is said, that so many persons of that class become, as they advance in life, unhappy and morose.

That diseases of the ear are hereditary there is little doubt; and next to the congenitally deaf and dumb, I believe that nervous deafness is the most frequent form in which the disease is transmitted; but, whether arising from some congenital peculiarity of the auditory nerve, which only becomes developed in after life, I cannot say.* I know many cases in which mothers and daughters are deaf. I have also known several members of the same family and its collateral branches deaf of one ear. In the upper ranks of society the disease is much more frequent in females than males. The subjects of it are generally of a sallow complexion, of a phlegmatic disposition, with a thin, cold skin, and languid circulation, and some are said to have a low state of sensibility of the auricles. In most cases the patients hear better when travelling in a carriage, or wherever they are exposed to a certain amount of noise attended with increased vibration; but this is occasionally observed in other forms of ear disease.

The disease commences insidiously, and is often more frequently remarked by the friends than by patients themselves, who

* Upon the subject of congenital and hereditary deafness, see the Chapter on Muteism.

are usually most unwilling to admit the possibility of their not hearing as well as other people. Many deaf persons trace back the first accession of disease to grief, affliction, sudden mental emotion, to a shock, or to some great calamity. In many cases it first appears after child-birth; but it ordinarily comes on between twenty and thirty-five years of age. It generally commences on one side, but sooner or later extends to both ears, although the patient almost always hears better on one side than the other. It is strange, but nevertheless true, that in general the musical ear remains unaffected: persons will play in perfect time who can scarcely converse. In nervous deafness, especially in females, the patients invariably hear worse on being in any way excited, as by suddenly seeing a stranger undergoing a medical examination, &c. I think males hear rather better after dinner. Both suffer much from depressing emotions.

Tinnitus aurium, so common an attending symptom on every form of aural and many cerebral diseases, is a frequent but not an invariable companion of nervous deafness. It may exist at the commencement of the disease, and be lost in after life; but, except under excitement—and in the majority of such cases I believe the disease is cerebral—it seldom supervenes. The existence or non-existence of this single symptom led Dr. Kramer to divide nervous deafness into the Erethitic, in which the diminution of hearing is accompanied sooner or later with noises; and the Torpid form, in which there is a total absence of that symptom,—the former being incurable, the latter curable, according to his opinion, by the application of medicated vapours to the mucous membrane lining the Eustachian tube, the cavity of the tympanum, and the mastoid cells! Of that gentleman's views, his explanation of nervous deafness, and his statistics of ear diseases, I have already fully and freely expressed my opinion both in this work (see pp. 28 and 104) and elsewhere.* These doctrines, and this division of nervous

* See the correspondence between Dr. Kramer and myself, in the London Medical Times and Gazette for 20th November, 1852, and 12th and 19th February, 1853. In Dr. Kramer's reply to my first letter, he says, "I cannot forbear advising Mr. Wilde," and, by Mr. Wilde, all other readers, examiners, and criticisers of his work, "to lay aside for ever the first edition of my 'Diseases of the Ear,'" by which he alludes to the second German edition, which appeared as the first English translation in September, 1837. Now, this

deafness, were caught up and reiterated by English aurists, without, in my opinion, a fair and careful examination of the grounds upon which they were founded.

work of Dr. Kramer's having gained for him considerable reputation; having, I am free to acknowledge, effected much good in reforming the state of aural surgery in Great Britain; having been admirably translated by Dr. J. R. Bennett; published by Messrs. Longman at considerable expense; and having, upon the faith of several laudatory reviews, been largely purchased by the profession in these countries,—I confess I do not think it fair for the author to come out, at the end of a number of years, with a wholesale criticism of his own production, by desiring me and every other possessor of the work to lay it aside for ever; and, forsooth, because alterations, such as the following, have taken place in a new edition of the same, "as the result of a twelvefold more extended experience," spread over a period of upwards of sixteen years. One of the alterations and amendments to which Dr. Kramer refers runs thus :—

"In both forms of nervous deafness I have *almost always* found the membrana tympani white, like paper, and opaque." (English Translation, p. 260; 1837.)

"In cases of nervous deafness I have *not seldom* found the tympanal membrane white, like paper, and opaque." (Last German Edition, p. 722; 1849.)

When an author modifies, or altogether discards, opinions which he formerly entertained and promulgated; and that his new views are the result of increased experience, a more extended field for observation, and a calm consideration of the opinions of others, we cannot but honour his candour; but, when statistical statements are reiterated and put forward to the profession as facts, which were not only compiled under an erroneous idea, but which absolutely formed a portion of the basis of a work which, although it gained considerable reputation, the author now advises us "to lay aside for ever," I think we have a right to ask that author to go back upon his materials, and to re-arrange his figures from the date when he first began to modify his views. When Dr. Kramer's first English edition appeared, in which he believed the condition of the membrana tympani, in nervous deafness, was "almost always white, like paper," he stated that, out of 300 cases of diseases of the ear from all causes, 152 were instances of that affection. In 1845, he gave to the world the statistics of 2000 cases of diseases of the ear, in which nearly the same proportion obtained, for 1028 were attributed to "nervous deafness;" but, in 1851, he gives an account of 2000 additional cases, in which the former proportions are considerably modified, for only 1875 were attributed to "nervous deafness;" and I entertain a strong hope that Dr. Kramer will live long enough (and I wish him long life and success) still further to modify his views; and, instead of "not seldom," to state that he has "very seldom," or "never," found the tympanal membrane white, like paper, and opaque, in cases of nervous deafness.

In support of his theory Dr. Kramer gives three reasons to account for the white paper-like appearance of the membrana tympani, which he, at first "almost always," and afterwards "not seldom," observed in cases of nervous deafness. Two of these are negative, and one positive, if speculative assertion for a pathological appearance can be termed positive.

1. The first is that the person so affected had never suffered from inflammation. Now

Other German writers, with that morbid taste for minute subdivisions of disease which characterizes many of the writers of that

how did Dr. Kramer know that not one of these cases ever had been affected with inflammatory action? He did not examine the ears when the disease first commenced; and pain not being experienced by the patient, attention was not attracted to the part. Suppose I was to show Dr. Kramer a dozen cases of impaired vision, with discoloured and partially disorganized iris, in which the posterior surface of that structure was adherent to the front of the lens, in which the sclerotic was congested and partially thinned, so that the choroid appeared through in several spots, in which there had been, during the progress of the disease, little or no pain, and but slight external vascularity;—or again, cases of opaque cornea, the result of strumous corneitis, in which there is often very little pain experienced,—would Dr. Kramer undertake to say that the organ had never "been previously affected by any inflammatory action?"

2. Dr. Kramer says this opaque membrane attending nervous deafness presents the same concavity externally as in a healthy state, while that which results from inflammatory action is invariably connected with thickening of its substance, flatness, and disappearance of its normal concavity. This collapsed state of the membrana tympani, which, he says, attends the opacity unconnected with nervous deafness, he himself formerly laughed at, and criticised with extreme severity all those who entertained such opinions.

3. "The condition of the tympanal membrane, above referred to, and its white paper-like opaque appearance," says Dr. Kramer, "is always joined with complete want of cerumenous secretion, with dryness and a parchment-like alteration of the meatus auditorius externus, undoubtedly the consequence of impaired action of the vegetative process in the affected organ."

This want of cerumenous secretion and dryness, which Dr. Kramer considers a diagnostic of nervous deafness is a very old phantasy indeed, and totally unsupported by modern investigations. I believe it to be the result either of the same inflammatory action which affected the tympanum and its membranes, having extended to the lining of the meatus and cerumenous glands, and having, consequently, impaired the functions of the latter, —or to the amount of syringing and other interference with the auditory tubes. I may mention as a fact worthy the attention of Dr Kramer, and such of his readers as believe that deficiency of cerumen is a symptom of nervous deafness,—that I lately examined the ears of a number of congenitally deaf and dumb persons, and found that the secretion of ear-wax was just as plentiful in them as in the same number of persons with healthy ears. With respect to Dr. Kramer's theory of accounting for the opacity of the membrana tympani, by "impairment of the vegetative process," I really am unable to understand it.

So fully impressed, however, is Dr. Kramer with the great importance of Eustachian catheterism in all cases, and of the diagnostic value of the want of cerumen and the state of the external conduits, that at page 725 of the new edition of his book,—that for which he says he is now alone "accountable,"—he writes, "in by far the greater number of our cases the ear catheter (*Ohrenkatheter*) shows the auditory tubes (*Gehörgänge*) dry, and even covered over with delicate scales or broad white flakes, so, although the tympanum appears not unfrequently transparent and shining, it is much more frequently opaque, dull, and white as paper,—conditions, however, which, from their variability, can in no way

country, have still further subdivided nervous diseases of the ear, —as, for instance, Dr. Schmalz, who, in the work alluded to at page 30, gives the following subdivision:—First, Irritation of the auditory nerves:—1. Morbid acuteness of hearing; 2. Tone echoes; 3. False hearing; 4. Double hearing; 5. Noises in the ears—which, properly speaking, are not diseases, but symptoms:—and secondly; Paralysis of the auditory nerve, induced by the following causes: 1. Congenital and inherited; 2. Senile; 3. Degeneration of the nerve of hearing; 4. Violent noises; 5. Intense frost; 6. Mechanical injury and concussion; 7. Depressing emotions; 8. Typhus and nervous fever; 9. Apoplexy, convulsions, and pressure on the brain; 10. Determination of blood to the head; 11. Anæmia from hemorrhage, onanism, &c.; 12. Exanthemata, especially when of a nervous character;—a catalogue which, if given in the original, or turned into Greek, might serve to swell such nosological charts as that to which I have alluded at page 36; for with as much propriety might the various causes of fracture of the extremities, or of inflammation of any of the internal organs, be described at length in systems of medicine or surgery.

Local congestion is, I think, a not unfrequent cause of cophosis, as it is a usual cause of asthenopia or impaired vision; but, as I have already stated, some of the very worst cases of true nervous deafness which I have seen did not exhibit the slightest alteration in structure in any of the parts susceptible of examination.

Nervous deafness must be treated according to its cause. As well might the ophthalmic surgeon be asked how he would treat loss of sight,—passing from slightly impaired vision to complete amaurosis,—as an aural practitioner be required to afford a cure for deafness. The treatment of nervous deafness has occupied the attention of many distinguished practitioners, and various reme-

be considered as characteristic marks of the disease. Much more important, even decisive, is the examination of the middle ear by the catheter."

At page 390 I have given an extract from Dr. Bennett's translation, as to Dr. Kramer's explanation of the way in which the fumes of Ether enter the labyrinth. To that he may now reply by saying, it is altered in the new edition. True; but, as it is the only mode by which the action of the "vapour cure" can be supported, and as he still promulgates that doctrine, and supports it by cases, I feel that I have a right to criticise it, and expose its fallacy.

dial means have been proposed for the cure or alleviation of this hitherto most intractable disease; but as yet neither specific nor panacea has been discovered for functional impairment of the auditory nerve, unconnected with diseased brain or organic changes in the ear, no more than practitioners have yet discovered a *cure* for amaurosis, loss of smell or taste, or paralysis of the nerves of either motion or sensation. Various and manifold are the remedies which have been proposed by authors; most of them, however, have been crude and empirical, and as yet none have had the desired effect. Purgation, and acting on the mucous membrane, has been advised by one; emetics by another; counter-irritation by a third; mercury by a fourth; electricity and galvanism by a fifth; and fumigation of the cavity of the tympanum and Eustachian tube with medicated vapours, is the latest novelty with which the world has been favoured for the treatment of this disease. Dr. Kramer says that the English practitioners have departed the farthest from the right path in the treatment of this affection; and is pleased to criticise their opinions with his usual asperity:* had, however, the Berlin aurist been as familiar with English medical literature, or the relative merits of English practitioners, as he would wish his readers to believe, he would not have classed in the same category the writings and opinions of the late John Cunningham Saunders, with those of Mr. John Harrison Curtis. Saunders was not only fully up to, but rather in advance of, his time; and, had he lived, he would probably have done much to advance the science of aural as well as ophthalmic surgery. How did he treat what he considered to be nervous deafness? Just as he would a case of amaurosis,—first taking into account its probable cause, and the constitution and present condition of the patient, and applying to it the common-sense principles of medicine and surgery. He employed counter-irritation, moderate purgation when necessary, and the continued use of mercurials, with, subsequently, tonics, such as sarsaparilla and bark —believing, as he did, that the loss of hearing arose from congestion, inflammation, and effusion of lymph or serum within the laby-

* In the *last edition* of his work, Dr. Kramer says, the English aurists must be denied any opinion on the subject.

rinth; and, although forty-seven years have elapsed since his book was published, I do not find anything proposed in the foreign literature on this subject, nor have I myself met with cases in practice, which lead me to deviate materially from the opinions with which that distinguished surgeon concludes his work, and which I, therefore, here transcribe,—"Confirmed nervous deafness is, without doubt, hopeless; but I know not, *à priori*, how to determine when attempts are vain. This does not altogether depend on the time, but the degree of mischief done to the organ; and the periods at which it becomes incurable must be various. My object is to direct the attention of the practitioner to the commencement of this species of deafness. When early application is made, it behoves him to take the case seriously in hand; for no time is to be lost, and active means in the beginning will often succeed. It is far from my inclination to excite a hope that old cases of this species of deafness admit of cure. I have never seen or heard of any cured by any plan of treatment whatsoever; and as to the various vaunted remedies with which the public prints are daily teeming, I know them to be absolutely inefficacious, and often prejudicial."—p. 99.

To remedy this disease, it was proposed by Itard, and has been strongly recommended and extensively practised by Dr. Kramer,—and, since the publication of his work, it has been constantly republished by authors,—to cure nervous deafness by introducing the vapour of acetous ether into the cavitas tympani through a Eustachian catheter, to which is attached a flexible tube communicating with an apparatus containing the gas. In order to force the vapour through the tube, various ingenious devices have been resorted to; but latterly the chief upholder of the system conceived that the ordinary temperature of a warm room was sufficient to vaporize the fluid, and send it through the catheter into the middle ear; which I think very questionable. During the time when, *jurare in verba magistri*, I employed that remedy extensively, my mode of operating was as follows: Having introduced the catheter into the mouth of the Eustachian tube, I applied the air-press, and assured myself that the air passed freely into the tympanic cavity. A large glass preparation-jar, capable of holding several quarts, was then fitted with a cork buffed with leather round the

edge, so as to prevent the gas escaping; this cork contained three apertures—to the first was attached a flexible tube communicating with the Eustachian catheter; to the second was fitted a small metal pipe, furnished with a funnel and stop-cock, into which a few drops of the ether were poured from time to time, as the patient became conscious of the quantity contained in the jar being expended; and into the third was inserted the metallic nozzle of the tube in connexion with the air-press. When this apparatus is about to be used, the free extremity of the first tube is inserted into the catheter, the air-press is charged, and a few drops (for more will not be borne, nor ought to be used) of acetous ether is poured through the funnel of the second tube into the glass vessel, and then the stop-cock of the air-press turned just so much as to permit the least possible stream of air to pass into the jar: and from it, charged with the vapour of the ether, it passes up through the first tube into the middle ear. As soon as all the air in the condenser is exhausted, it should be re-charged. The patient is generally conscious of the vapour gaining the tympanum, and experiences a glow of heat in the ear. About ten minutes is usually sufficient for a sitting, and the patient, if intelligent, may be taught how to regulate the force of the stream of air. Dr. Kramer advises the remedy to be continued daily for three months.

Now, notwithstanding the vaunted merits of this cure for nervous deafness, I am obliged to acknowledge, although I gave it a fair trial, both according to the plan proposed by Dr. Kramer, and also by the means detailed above, that it has not been attended with success in any case of confirmed true nervous deafness, with or without tinnitus; neither have I known a single case of such cured by this mode of treatment in the hands of others. I have not thought it necessary to enter into the details of the various apparatus which have been invented, nor the different substances proposed by M. Wolff and others, for fumigating the middle ear, as I think it quite unnecessary to occupy the time of my readers therewith; those who wish to be informed thereon will find an epitome of the subject in Martell Frank's book, referred to at page 30.

Let us now, in the name of common sense, inquire into the *rationale* and the *modus operandi* of the "vapour cure." The auditory

nerve, expanded within the membranous labyrinth, the cochlea, and semicircular canals, is functionally diseased—atrophied, or, as some writers term it, "paralyzed;" and, with the exception of a deficiency of cerumenous secretion in the external meatus, said to attend this disease, all the other parts of the ear—the membrana tympani, and the mucous lining of the cavity of the tympanum and Eustachian tube—are healthy. Gas, or medicated vapour of some description, is applied to the middle ear for the purpose of stimulating or renovating the dormant action of the parts contained within the cavity of the labyrinth,—just as, a few years ago, we heard the virtues of the vapour of Prussic acid, when applied to the conjunctiva, cornea, and eyelids, extolled as a cure for amaurosis and cataract. It is really preposterous to imagine how such an effect could be anticipated; and one would be inclined to call in question the common sense of the proposers, but that a solution may be offered, at least in Dr. Kramer's case, by a perusal of the following paragraph from his book:—"It must always be kept in view, that the cavity of the tympanum, which first receives the etherous vapour, is extremely small, and that even when *the vapour passes through this cavity into the labyrinth, by means of the foramen ovale, it has to fill an equally small*, or even still smaller, space than that formed by the cavity of the tympanum!" Can it be that Dr. Kramer has forgotten his anatomy, or that the school of Johannes Müller credits the assertion, that, in an ear where the structures of the tympanum are perfect, vapour passes through the foramen ovale, closed by the base of the stapes and its surrounding membrane and ligaments? or, does endosmose, the only principle on which a plausible explanation can be offered, really exert such an influence as that here alluded to? If this be the principle (although he does not make any allusion to it) by which Dr. Kramer would account for the action of his favourite remedy, one would have thought, from a knowledge of the anatomy of the parts, that the membrane closing the foramen rotundum would be a better medium for the passage of the gas than the base of the stirrup bone. But yet this is not all; the vapour is to *fill* the cavity of the labyrinth, thus replacing the perilymph, in order to come in contact with the expansion of the auditory nerve! This

opinion is, however, on a par with the proposition made by the same author,—and to which I have adverted at page 105,—to judge of the state of the auditory nerve by the introduction of a catgut, an ivory, or a whalebone bougie into the cavity of the tympanum. Mr. Jones has, in his essay already referred to at page 32, reiterated all these absurd opinions regarding nervous deafness, not, however, as expressing his own ideas on the subject, but prefaced by this careful proem,—"The following is a sketch of 'Nervous Deafness' as commonly drawn by authors."

To these objections it may be urged, that several cases have been cured. Granting that some such instances have been recorded, it in no wise follows that the disease in such cases was one of pure nervous deafness. On the contrary, I believe that, where benefit has been derived, the cause of deafness was originally chronic inflammation, and, subsequently, thickening of the mucous membrane of the cavitas tympani—a part highly endowed with nerves, the diseased condition of which, as already pointed out by Mr. Swan, must materially impair hearing.

Mr. Pilcher has recorded, under the head of "Nervous Diseases of the Ear," a case of "torpid functional derangement," of which the following are the particulars, as given at page 318 of his book, and afforded partly by the patient and partly by the author: and which I have selected, not in a spirit of hypercriticism of a really useful work, but in the hope of correcting what I believe to be an error arising out of the too hasty acceptance of a particular doctrine. A clergyman says,—"At the age of sixteen my sense of hearing was severely injured by a *succession of violent inflammatory attacks* in my ears. About thirty-four years have elapsed since that period; and, during all that time, I have been almost entirely deprived of the use of my right ear, and have had but an imperfect use of my left. . . . In the course of last winter I was afflicted by a severe and obstinate attack of *quinsy*, which, *as usual*, very much affected my hearing." The increased deafness thus occasioned continuing some months after his recovery from this attack, he was induced to submit to medical treatment, and says, "I soon began to experience surprising benefit, particularly in my right, which, for the greater part of my life, had

been entirely useless." He concludes by stating, that his hearing has been perfectly recovered. The only record given of the objective symptoms in this case are as follows: "The lining membrane of the external ears of this gentleman is dry and scaly; the Eustachian tubes are *large* and pervious, and the symptoms denote a torpid condition of the acoustic nerve, attended with occasional tinnitus aurium." A diseased condition of the mucous membrane of the left nostril presented difficulties to the introduction of the catheter upon that side. Not one word is stated as to the condition of the meatus, the state of the membrana tympani, or the sounds produced in the cavity of the tympanum by the air douche in this disease,—which the patient himself, it must be remembered, attributed, and I think most correctly, to a succession of violent inflammatory attacks in his ears;—neither is the hearing distance upon either side recorded at the time when the treatment commenced, or at any subsequent period. "The treatment," says the author, "pursued in this case was, the application of the vapour of acetous ether two, and sometimes three, times a week, the patient's avocations not permitting the more frequent use of the remedy; when the vapour did not produce a sensible effect, the much diluted mixture of ether and water was injected." Now, I challenge the whole array in this case, and protest against its being, with the defective details above stated, allowed to remain upon the record of British medical literature as an instance of nervous deafness from torpid functional derangement. But the same difficulties, the like defective details, and illogical reasoning, pervade every department of medical literature, as must be experienced by those who for any particular purpose have occasion to search books and periodicals for cases bearing on any special subject. Their path is beset with difficulties; the cases which they have seen quoted as proofs of a particular doctrine turn out, when they come carefully to examine them in the original, to be either altogether defective, or by no means proving the position for which they had long been employed. I have often thought it would tend to bring medicine up to the state of a more exact science, if some one with sufficient knowledge, honesty, and common sense, and having time at command, would search out and carefully analyze from year to year, or in

particular branches of medical science, the remarkable cases that are continually put forth, and thus purge our literature of those which I will not say are unworthy of credit, but which certainly do not afford proof of that for which they were related by their authors. Mr. Pilcher has also propounded a doctrine to which I cannot assent; it is that of deafness occurring from a person having neglected to use the ear. I cannot well understand how, except by stopping the meatus, any one can neglect to use the ear.

It may be asked, before concluding this Chapter upon Diseases of the Internal Ear, whether I have nothing to offer but criticism of other men's statements and opinions with respect to the cure of nervous deafness? For confirmed cases of such, particularly when of an hereditary nature, I have nothing to offer but an ear-trumpet, and a strong recommendation not to quack. For incipient nervous deafness much may be done, if not to restore perfect hearing, at least to arrest the further progress of the disease, and avert a condition to which, sooner or later, the unhappy patient may be reduced. Counter-irritation, long kept up; the judicious use of mercurials adapted to the age, circumstances, and condition of the patient, and persevered in for months; relieving the person from any exciting cause, whether connected with plethora or debility, which may appear to hasten the catastrophe; and, in one word, by improving the general health by such means as any experienced physician or surgeon can apply, will, and often does, avert complete nervous deafness. Finally, with the exception of counter-irritation behind the ears, I would entreat my readers carefully to abstain from all topical applications.

Of cerebral deafness, or that arising from chronic disease of the brain or its coverings, and which is usually accompanied with giddiness, derangement of the stomach, and a manifest impression upon the general health, a good example is afforded in the case of the celebrated Dean Swift, on which I have already remarked.* For such cases an issue in the nape of the neck is the best treatment.

* See "The Closing Years of Dean Swift's Life."

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CHAPTER VIII.

OTORRHŒA.

Otorrhœa: Statistics of; Forms of Disease, and Parts engaged; Causes; Prejudices against Healing; Metastasis.—Characters of Discharge.—Simple Catarrhal Otorrhœa: its Treatment, Local and General.—Astringent Lotions.—Periosteal Inflammation.—Complications of Otorrhœa: Tympanic, with Perforate Membrane.—Granulations.—Fungi.—Polypi: their Varieties; Treatment: Excision; Escharotics; The Snare.—Consequences of Otorrhœa.—Caries of Mastoid Process.—Facial Paralysis; Double and Single.—Discharge from Internal Ear.—Cerebral Affections consequent upon Otorrhœa; their Fatal Character: Abscess in the Neck; Purulent Infection of the Lungs.—Ear Trumpets.

AS the great majority of the inflammatory affections of the ear described in the previous chapters of this work may, and do frequently, terminate either in suppuration, or in effusions of serum, mucous, or muco-purulent fluid, it necessarily follows, that *otorrhœa*, or a discharge from the ear, must be a very frequent disease. A reference to the Nosological Table, at page 147, will show many, though not all, of the affections which may end thus; for frequently "a running" from the external meatus commences without any previous warning, the lining of that tube passing imperceptibly from a cuticular to a muco-secreting surface; although I believe, if carefully examined at the moment, it would be found to result from slight and painless inflammatory action in the part. Although otorrhœa is not, properly speaking, a disease, but the result of several diseases, yet, from its importance, its frequency, its constitutional character, and the many serious diseases which it originates, I have here, in addition to the different notices of it throughout this book, devoted a special chapter to its consideration.

"A discharge from the ear" is by far the most frequent aural disease of these countries; but, whether owing to the variableness and humidity of our climate, the prevalence of scrofula, or to neglect, it is difficult to say. As may be seen by the Table given at page

102, it amounted to 647 in 2385 cases registered from all causes, or about 1 in every 3½. Of these, 64 were complicated with polypi,—40 males and 24 females; and in 55 instances the membrana tympani was either perforated or altogether removed. The total sexes were, 350 males, and 297 females. Otorrhœa is a disease of infancy and youth; it seldom appears in middle life, and still less frequently in advanced years; and although we may be often consulted by adults for this affection, it will generally be found that the discharge, if not of very recent date, came on years before. An examination of the Registry of ear cases, given in Chapter III., shows, that as many as 83 in 200 were either at the moment suffering from, or had at some previous period laboured under, Otorrhœa (see page 135). Of these, 23 had, either at the moment or at some previous period of the disease, a discharge from both ears; 25 from the right only, and 24 from the left alone. With respect to the duration of the disease at the time these patients sought advice, 23 had been affected for different periods, varying from a month to a year; in 12 cases the discharge existed for from two to three years; in 11 instances for from four to five; in 13 cases from six to ten; and in 13 for over ten years.

I suppose there is scarcely a member of the profession in any of its various branches, who has not been frequently applied to by patients, young and old, of both sexes, of every age, and among all ranks and grades of society, labouring under a discharge from the external ear—one or both—more or less affecting the hearing, in some cases attended with tinnitus aurium, and in all giving rise to great annoyance and inconvenience, from the dirt, and often fetid smell which it occasions. With some this may be of short duration, and with others, the majority of whom are those that present themselves to surgeons practising aural surgery, of many years' continuance. Indeed, one only wonders how sensible men could go through life apparently unconcerned with such a loathsome disease about them. Many, it is true, endeavour to conceal the affection, and others are deterred from taking proper advice by the prejudices of their friends, or even their family medical attendants. Let me illustrate the general progress of a case of aural discharge, by no means imaginary,

but presenting as the type of hundreds who daily apply for advice in these countries, where it is a disease of such common occurrence.

During infancy, about the time of dentition, or at any other period of childhood—upon the sudden subsidence of purulent ophthalmia—during the progress or as the sequel to any of the exanthemata—either from the effects of cold, the manifestation of scrofula, an impaired condition of the digestive functions, or any other of the causes inducing inflammation—a child is suddenly attacked (often in the middle of its sleep) with pain in the ear, frequently of the most excruciating character, accompanied by brisk fever, and at times even producing delirium. What is the treatment generally had recourse to? Hot oil, turpentine, essential oils, laudanum, camphorated spirit, the volatile liniment, and such other stimulating substances, are unmercifully dropped into the ear. And if it be a grown person, in addition to all these, a large clove of garlic* is forcibly thrust into the meatus, and a hot poultice of roasted onions or figs is applied to the auricle. As already observed under the head of Otitis, the disease proceeds, and days and nights of extreme anguish, attended with much restlessness and anxiety, are passed by the sufferer. No examination is made all this time of the parts affected, but purgatives are freely administered, and perhaps a blister is applied over the mastoid process. At length suppuration ensues, and when the discharge has been fully established, relief is experienced; the disease then becomes chronic, the discharge profuse, flaky, discoloured, sanguineous, and frequently fetid; partial deafness follows, but the constitution suffering little, there is not much attention paid to the disease.

Sometimes the discharge commences without pain, as a catarrhal inflammation of the lining membrane of the meatus auditorius externus, and if in an infant, or a child or young person, the first indication of the disease is the soil observed on the cap or the pillow. In a grown person, the history given of the disease is, that

* I have seen three cases during one year of violent inflammation of the membrana tympani and meatus caused by the use of garlic.

on inserting the end of a towel, or the point of the finger, to relieve an itching in the meatus, a slight moisture was seen upon it; and that then the unpleasant smell attracted attention, and in time the amount of discharge and subsequent loss of hearing became apparent. If treatment be employed in this stage, further than keeping the parts clean by syringing with tepid water, in what does such consist? In again having recourse to nostrums of a still more empirical and violently stimulating nature than at first, such as tincture of cantharides, oil of originum, creasote, and the most violent escharotics, which are poured into the meatus; and in order to exclude the air, and *keep in* the discharge, a ball of black wool is crammed into the ear.

Should the friends or the patient seek still further advice, they are generally told to make their minds perfectly easy about the matter; that it is entirely a constitutional affection; and that as the person gains strength and years, the discharge will cease, hearing return, and all be well,—but that at this period it were not advisable to check the discharge; an issue is inserted in the arm, and they are recommended sea-bathing, with sometimes the use of a slightly astringent lotion. Notwithstanding all this doctoring in the dark, the disease generally proceeds: if we inquire minutely about this period, we will frequently be told by the patient or the attendants, that two or three small bits of bone had come away with the discharge,—that this discharge varies in quantity and quality from time to time,—that sometimes it becomes thick and ropy, of a yellowish colour and mucous consistence, and very much less in quantity; that then, upon the person's being exposed to cold, a sudden exacerbation took place, the discharge became thin, whitish, flaky, and so much increased in quantity as to pour out of the meatus, and saturate the night-cap and pillow.

After this condition has continued for a year or two, and we come to examine the state of the parts, we find the margin of the external meatus thickened, of a pale red colour, and its upper portion, in particular, coated with yellowish brown crusts; from the under margin, and filling the cavity of the concha, proceeds a slimy muco-purulent, ropy fluid, of a greenish-yellow colour and fetid smell, while the meatus itself is filled up with purulent

discharge, in the centre of which, in a great number of cases, appears a small granular mass, not unlike the apex of a raspberry; and on lifting up the auricle to examine the ear, by pressing on the tragus, and sometimes on the mastoid process also, or by touching the passage, pain is almost invariably complained of. When a polypus of this description, appearing through the external meatus, is perceived, surgical aid is again generally sought; the morbid growth is grasped with a forceps or ligature, and a portion of it forcibly torn away, but as the root remains, and soon sprouts into fresh existence, it is attempted to be destroyed by powerful escharotics, and a stick of nitrate of silver, of the size generally used in commerce, is thrust into the meatus as far as that aperture will permit, or the torture of the patient bear. From this, fresh inflammation and ulceration of the walls of the canal ensue, causing intense pain, extending through the head, and at times producing irritative fever. More emollient applications are then had recourse to,—the polypus resumes its original size, very seldom extending beyond the external opening of the meatus, and is either carried through life with the deafness which it causes, or proceeds to a more dangerous state, as already described at page 207. Suppose, however, as it sometimes happens, that this polypus or fungus does not grow, or at least does not appear externally, the period of puberty arrives; the constitution, in accordance with the opinion originally expressed, does take on a new action,—the discharge diminishes, and then may even finally cease,—but undoubtedly with either a considerable diminution or a total loss of all accurate hearing.

But this is not the worst,—the discharge may *not* then cease; the ulcerative process may then, or at any previous or subsequent period *during the continuance of the discharge*, suddenly and rapidly extend; the membrana tympani is destroyed; the bony walls of the meatus and the tympanum become carious; the ossicula are lost, or are rendered incapable of performing their functions; the disease spreads into the mastoid cells, and the whole of that process of the temporal bone becomes carious; fistulous openings occur behind the cartilage; a thin, brownish, highly fetid discharge ensues; the auricle frequently assumes a bluish, livid ap-

pearance; the motor portion of the seventh pair of nerves becomes affected, or absolute lesion of its substance takes place; the mouth is first observed to be slightly drawn towards the opposite side, and paralysis of one half of the face quickly follows; the palpebræ remaining apart, give the globe of the eye a peculiarly prominent staring appearance; the cornea, from want of its natural covering, and the injurious effects of the atmosphere, abrades and ulcerates; the ala nasi becomes flattened; the mouth is much distorted (particularly if in a child when it cries); and the whole cheek and side of the face looks fuller. Hearing is in most instances completely lost on that side; the general health frequently sinks under such accumulated misery; and even if recovery takes place, it is after months of suffering, and always with deformity. At times, and that not unfrequently too, the disease spreads still farther to the petrous bone; the brain and its membranes participate in this unhealthy action; irritation, fever, rigors, and cerebral symptoms of an insidious nature follow, and delirium, convulsions, coma, and death ensue, as shall be explained more fully at page 426; or the patient may die suddenly of hemorrhage from an open carotid. And yet this is the disease thought so lightly of by the public and the profession, and described as "only a slight running from the ear."

After the frequent mention of this disease in the previous portion of this work, it is unnecessary to enumerate systematically, all the *causes of otorrhœa*.*

Porrigo, crusta lactea, herpetic, and other eruptions extending to the ear, produce, particularly in unhealthy children, otorrhœa. Mechanical injuries, such as blows, or the introduction of foreign bodies, will, no doubt, produce otitis, and afterwards discharge; but unless in persons of marked strumous habit, or very much broken in health, it seldom continues for any length of time or proceeds to anything serious. Under the head of mechanical injury has been reckoned impaction with hardened wax; but I can only say I have never witnessed it, nor do I believe it likely, from the way in which it is formed and retained, to cause otorrhœa. I have several times met with cases of otitis ending in otorrhœa, produced by improper syringing of the canal, under the supposi-

* See the various references to the term Otorrhœa in the Index.

tion that the deafness arose from a plug of wax; whereas the fact was, no wax existed. In these cases no proper examination had been made, or this error would not have been committed, for the syringing was several times repeated, and continued for nearly half an hour each time. Fevers of every description (and indeed long illnesses of any kind), but the exanthemata more particularly, often induce aural discharges.

Cold bathing is a much more frequent cause of otorrhœa (I suppose by producing slight inflammation) than is generally suspected. Mr. B. had otorrhœa from his early childhood in one ear; which, by the advice of his medical attendant, was not interfered with, although the cophosis it occasioned was yearly increasing. In his instance, the promise of amendment in time was realized, at least as regards the discharge: it ceased about four years before I saw him, but he was then almost totally deaf at that side. During the heat of summer he bathed in the sea, and almost immediately felt an unpleasant sensation in the affected ear, which increased to pain during the night; next day the discharge was re-established. On my seeing him some time after, and examining the ear, I found that this profuse discharge proceeded from a fungous mass that grew from the middle ear, through a large aperture in the membrana tympani, over which it spread like the head of a mushroom, and which opening in the membrane had, no doubt, occurred during the progress of the original otorrhœa. I mention this case in particular, because it illustrates the destructive effects upon the organ by neglect, and also of the careful manner in which patients should proceed even for years after the running has ceased. Persons having been recommended sea-bathing for the cure of the discharge, think they cannot have too much of a good thing, and continue it long afterwards. During the bathing season I meet with several cases of primary and secondary otorrhœa ascribable to this cause.

Erysipelas of the scalp, or confined to the auricle and meatus alone, is a constant cause of chronic thickening and mucous discharge from the ears, but it is seldom profuse, and partakes more of the slight secretions attendant on other diseases of the skin, where generally the thickened cuticle continues to be thrown off

for some time;—the passage, however, never becomes, as in other cases, a purely secreting mucous surface, or throws out granulations or vascular excrescences.

Syphilis and gonorrhœa have been enumerated by writers as producing discharges from the ears, but I have never met such cases; and I do not think that the instances mentioned by authors prove that the external meatus is, in its ordinary state, susceptible of infection with the virus of either syphilis or gonorrhœa (see page 196). Gout has also been said to cause an aural discharge (see page 266).

If, however, there is a disease more than another that shows a strumous constitutional taint, I believe it to be otorrhœa, particularly that form of it which appears in children and young persons without any apparent cause. We find the affection either commencing originally as scrofula, or so intimately connected with a scrofulous condition of the glands of the neck, and the general appearance of the patient, as to leave no manner of doubt as to the nature of the affection. This form either commences by a thin, whey-like discharge from the meatus, arising from a vitiated state of the lining of the tube and membrana tympani, or by suppurating glands, communicating, by means of a fistulous opening, with the auditory canal. For the most part these glands have likewise an external superficial opening; but I have seen some cases in children in which abscesses (generally lying immediately anterior to the tragus) opened into the meatus and had no superficial outlet;—in such cases pressure on the parts in front of the tragus, or the act of mastication, pressed the matter into the meatus. In some cases of phthisis, as I have stated at page 338, it is an attendant, and then the discharge possesses all the peculiarities of true scrofulous matter. It is also a not unfrequent accompaniment of those diseases of the lachrymal sac denominated fistula lachrymalis.

When otorrhœa takes place during the progress of or subsequent to scarlatina, it occurs in three ways, either by direct extension of the inflammation of the skin into the external meatus and membrana tympani, and there producing a muco-purulent discharge, while it desquamates over all the rest of the body; by the diseased condition of the mucous membrane of the throat

(and which may be styled scarlatinous) passing up through the Eustachian tube, and producing suppuration of the cavitas tympani and perforation of its external septum, as already described at page 339; or again, by the abscesses which take place in the neck and around the meatus, opening into the fibro-cartilaginous portion of that tube, and there inducing and maintaining, even after they themselves have healed, otorrhœa, from the diseased state of this portion of the organ. Measles not unfrequently induce a similar condition, but in that disease the latter mode of propagation is, I should suppose, much more rare; I myself have not seen any such cases. Aural surgeons seldom see this affection of the ear till long after the subsidence of the original disease. The only satisfactory account given with or by the patient is, that when they rose out of the fever, they were deaf, and had this discharge.

What was the original condition of the ear upon the setting in of the discharge? In all probability it consisted in simple inflammation of the lining membrane of the meatus and membrana tympani. If, at the very commencement of the affection, the ear was properly examined in the way I have directed, it would be found that the tube was dry, slightly red, and painful to the touch; that the secretion of wax was either wanting or scanty; that the membrana tympani had lost its peculiar pearly polished appearance, and had assumed a slightly pinkish hue, and that red vessels could be discerned in it, coursing along the position of the handle of the malleus. If this examination were to be made at a more advanced stage, it would be found that the cerumenous secretion had entirely ceased, that the cuticle lining the meatus had become thickened, and could be easily detached in whitish flakes, underneath which a thin, sero-purulent discharge oozed out, while the membrana tympani had become more vascular, and when the thin pellicle of cuticle which coats its external surface was cast off piecemeal with the discharge, it would be seen as red, vascular, and as villous as the palpebral conjunctiva of the lower eyelid in catarrhal ophthalmia: the position of the malleus would then with difficulty be observed Pieces of cuticle are then daily cast out with the discharge. If we examine this ear a few months subsequently, we shall find all trace of cuticle lost, and the whole

tube lessened in size by thickening of its walls, and also converted into a muco-secreting surface, the membrane of the tympanum being not only increased in vascularity, but absolutely covered with papilliform granulations, while in some cases, at this period, small polypous excrescences will be discovered growing either from the posterior inferior aspect of the tube, where the bone and cartilage unite, or sink in a sinus near the tympanal membrane. At a still more advanced period, the membrane of the tympanum frequently gives way by ulceration, the middle chamber opens externally, and some of the ossicula, particularly the incus, are discharged; from this period the disease may proceed, even to a fatal termination, in the manner which I have already described.

To remedy these affections general surgery has not done much, so that in many instances medical men are glad to get rid of such patients; and this, added to the prejudices in the minds of the community at large, and in some of the profession too, as to the injurious effects of healing or "drying up," as it is termed, discharges from the ear, has caused this affection, by ignorance and apathy on the one hand, and prejudice on the other, to be much neglected in this country. I am, however, happy to find, that since the publication of my Essay upon the Causes and Treatment of Otorrhœa, in 1844, some change has taken place in the mode of managing this severe and very general disease. Still, as many of these prejudices, both popular and professional, exist, let us briefly examine some few of the reasons assigned for the non-interference with aural discharges.

A lady applied to me with her son, aged seven (one of those cross-grained, ill-reared bears of children, the very plague of doctors), and asked me if I could cure him of "a very bad deafness," with which he had been affected for the last five years. After much coaxing and some frightening, I was permitted to look into the ears; both were filled with profuse muco-purulent discharge, ropy, fetid, and crusting on the external parts; an erysipelatous blush surrounded the thickened, scaly orifice, but having succeeded in cleansing the meatus, I could perceive a polypous excrescence filling up both tubes. Hearing was much improved by the removal (for the first time for many months) of the dis-

charge. Having explained the nature of the complaint, and that no progress towards the restoration of hearing could take place till these excrescences were removed, and the discharge healed, the lady at once informed me, that unless I could restore her son's hearing without drying up the discharge, she would have nothing done, for that some of her children having died of water on the brain, she was told by her family physician never to let this running from the ears be stopped, or that, if she did, he would instantly be similarly affected. I do not mention this as a solitary instance, but as a type of cases that I meet with almost daily, and chiefly among the middle classes of society; the poor are unacquainted with such medical refinements. One patient is afraid of apoplexy, epilepsy, or paralysis; the mother of another fears convulsions, hydrocephalus, or sore eyes; and a third cannot be persuaded that the discharge is not connected with his brain.

An English lady desired my advice for otorrhœa, more on account of its unpleasantness than for any other reason; the history she gave of it was, that when quite a girl, at school, she was attacked with pain in one ear, attended by a discharge, and that the latter had continued ever since, sometimes more, sometimes less, the hearing always variable, but yearly becoming worse, till now, when she found that ear of little use in general society. Almost immediately upon the appearance of the discharge, and several times subsequently, she had consulted a practitioner in aural surgery, who had always informed her, that to heal up this discharge, profuse, fetid, and disagreeable as it was, would be highly dangerous, and that in all probability it would then "go in upon her brain." I found the cuticle on the surface of the auditory canal white, thickened, and coming off in flakes, beneath which poured out a thin discharge; the membrana tympani had become perfectly opaque, thickened, and white as a leucoma; it was also very insensible to the touch, and it had fallen in towards the tympanal cavity, leaving the malleus projecting prominently outwards; it had likewise lost all power of vibration. In this case the discharge was removed by brushing over the parts with a strong solution of nitrate of silver, syringing night and morning with tepid water, and using an astringent lotion; hearing was but little im-

proved, yet her condition was rendered much safer, as well as very much more comfortable, and no unpleasant consequences have ensued since I first perscribed for her ten years ago.

These prejudices are of old standing and very general extension; they existed equally in the days of Saunders, who tersely asks: "What argument can be assigned against the cure of this disease that is not equally conclusive against all others? Is any one an abettor of the obsolete humoral pathology? He will contend, that the stoppage of a drain, which nature has established, is pernicious, and the morbid matter will be determined on the internal parts; but how can such a person venture on the treatment of any disease, even the healing of a common ulcer? Some years ago I thought this absurd doctrine had been totally exploded, and yet I constantly hear it adduced, to deter parties from interfering with this disease. Is a child the subject of it,—the parent is told it is best to leave it to nature, and the child will outgrow it. Is it an adult,—some other subterfuge, equally futile, is employed. The truth is, the disease is always tedious and difficult, and not always curable; and many are disinclined to embarrass themselves with the case who have not candour to make the true statement."

Many of those errors appear to have arisen with Du Verney, and were promulgated by Itard, Lallemand, and their followers; and, because it was observed that on the supervention of cerebral disease, discharges from the auditory passages have lessened, practitioners, mistaking the effect for the cause, have been led to believe that their sudden "drying up" produced a metastasis to the brain, a notion as crude as it is unsupported. Cases may have occurred, in which the improper application of powerful escharotics and stimulating injections, thrown by means of a syringe into the external meatus and tympanum, produced many of the disastrous consequences detailed by authors; but no record has come down to us of the precise pathological condition of such ears; nor do I believe that such ever were, or could at the time, have been properly examined. In all probability these cases were ones where extensive caries had already existed, and the internal ear may have been exposed to the improper remedies ignorantly applied in

the dark by persons who, having committed the mischief, subsequently raised an outcry agaainst the healing of aural discharges in *all* cases.

Itard, one of the chief supporters of this doctrine of non-interference has related a case in which death ensued upon the introduction of some linseed oil into the ear of a child affected with otorrhœa! That case, which has gone the round of almost every work upon aural surgery, since the publication of Itard's book, was one of the very foundation stones of the system advocated by its relater, although we know nothing of its previous history, nor what pathological appearance the bony case of the ear or the brain itself presented. Some years ago, St. John Long ascribed the death of one of his patients to the application of greasy substances to a sloughing sore which his liniment had produced; and surely with as much medical reason as that narrated by the Parisian aurist, since whose time our works upon aural medicine recommend great caution to be observed with regard to the introduction of oily remedies into the ear! This instance is but one out of many in which a system has been grounded upon as slender facts by the modern French school.

If the bone is sound, we might with as much propriety refuse to cure a chronic or an acute ophthalmia, an ozena, or a mucocele; and even if the bone is diseased, remedies should also be had recourse to; but of this form presently. Although I have not met such a case, I can, however, conceive one in which a discharge from the ears had succeeded upon and relieved head symptoms.

Mr. Williams, in support of his opinion, that "it is better not to interfere with this discharge from the ears," says: "If suddenly checked in children it frequently causes skin diseases, swelled glands in the neck, inflamed eyes, and sometimes brain affections." And again: "In adults, if discharges from the ear, particularly if from the internal ear, be, from any circumstance, suddenly stopped, head symptoms immediately commence;" and in support thereof he adduces cases related by Sir B. Brodie, Itard, Valsava, and Drs. O'Brien and Denmark. I find, however, upon carefully examining into the history and post-mortem appearances of these instances, that in four there was extensive caries of the petrous portion of the

temporal bone, with apertures leading from without into the cavity of the cranium, but which, from want of proper aural inspection, and an examination into the previous symptoms and the course of the disease, had not been even suspected. The fifth case was that of a French soldier, who happened to have otorrhœa subsequent to fever, and who left the hospital without leave, and got drunk. After he was brought back head symptoms set in, and then we learn that "the discharge was entirely suppressed." He died, and on inspection after death, "the sinuses were gorged with blood, the dura mater was detached from the bone throughout the whole extent of the right temporal and part of the occipital fossæ, and in the same situation was found about a spoonful of serum, almost yellow;" the dura mater was likewise coated with pus on its internal surface, the arachnoid thickened, the pia mater covered with puriform matter, and the lateral ventricle contained an ounce of thick serum. There was no other lesion of the auditory apparatus than the loss of the membrana tympani, which, however, it was previously stated, had been deficient since childhood. Will any pathologist take upon himself to say, that this was metastasis from the ear, and not direct uninterrupted extension of disease to the brain? Such cases are by no means uncommon after fever. In fine, I have not been able to discover one well-authenticated instance where disease of the head supervened as a consequence of checking otorrhœa in a case where the condition of the ear had been previously ascertained, and that disease of the bone had not existed beforehand. Men do not distinguish between the *post hoc* and the *propter hoc;* and, mixing up cause and effect, regard a symptom as a disease.

Under the head of the effects of otorrhœa, this subject will be again considered, but two questions of vital importance in the treatment of the disease here present:—one as to *prognosis;* the other as to the *morbid changes* to which long-neglected aural discharges may lead. With regard to the first, it should always be cautious, unless, indeed, we see our way through the case very clearly, and for this reason—that, *so long as otorrhœa is present, we never can tell how, when, or where it will end, or what it may lead to.* For this very cause, if no other or better existed, the old doctrine

of "letting alone," or "leaving to nature," such affections, should be exploded, and we should, by every means in our power, endeavour to heal them.

The prognosis must much depend upon the cause, severity, and duration of the disease; the extent of parts engaged; the presence of morbid growths; and the age, constitution, habits of life, and position in society of the affected person.

When the disease has arisen from constitutional taint, as a painless running on the one hand; and when, as the result of scarlatina, owing to acute inflammation, and suppuration of the tympanum, on the other; it is always difficult to manage. In any case of long standing, the discharge becomes like that which arises from a fistula, and its treatment is very tedious; and in every case, before promising the patient permanent relief, we should assure ourselves of the total extent of parts engaged. Simple external otorrhœa merely engaging the meatus and outer layer of the membrana tympani, will often, in unhealthy constitutions, baffle treatment, and continue "off and on" for months or even years. If there is an aperture in the membrana tympani ever so small, through which the cold air of the external atmosphere can come in contact with the delicate mucous surface of the tympanic cavity, although the discharge may cease for a time, it is liable to break out again upon the slightest provocation. Such perforations may, however, as already stated at page 303, heal up; but if a considerable portion of the membrane has been removed, although we may improve the patient's condition in every respect, we cannot promise that the otorrhœa will not return. So long as a polypus, even of the smallest size, exists in the meatus, or sprouts from the cavity of the tympanum, amendment cannot be hoped for until it has been removed. When the bony portion of the meatus is denuded, or that caries or necrosis exists in any of the parts from which the discharge proceeds, it were futile to expect a healthy action, until the diseased bone is either absorbed or cast off. If we have reason to believe that the internal ear is engaged, our prognosis must be still more unfavourable; and where the discharge proceeds from malignant disease, all hope must be abandoned.

With respect to the nature of the discharge, it varies con-

siderably at different times, and even in the same individual; from a thin, starch-like, sero-mucous fluid, containing scales of epithelium, to thick yellow pus; it is, however, generally muco-purulent, containing shreds of mucus, which float through the water; it is sometimes thin, watery, and sanguineous, and in such cases the disease is usually complicated with polypus; it is often, particularly in young children, of so acrid a nature as to excoriate the auricle, and even the side of the neck; in other cases it is exceedingly fetid, and of a dark drab colour. The colour and smell have been relied upon as means of diagnosis by several writers. As far as my observation extends, I cannot agree with the rules laid down in books, for although when caries of the bone exists, the discharge is generally dark-coloured and fetid, yet I meet many cases in which both these characters are present, without any exposure of the bone, and particularly when the tympanal membrane is perforated, and when the fluid comes from an inflamed mucous surface; but it may exist even without this destruction of substance.

There is another form of discharge occasionally met with in the ears, particularly of scrofulous patients, and which may be denominated "caseous," from its resemblance to softened cheese; it looks like a mixture of pale cerumen and pus, has a peculiar, heavy, sickening smell, and a pasty feel. It does not altogether dissolve in the water with which it has been removed.

The division of otorrhœa into internal and external merely depends upon the presence or absence of an aperture in the membrana tympani.

With regard to *the treatment of otorrhœa*,—our first step must be to examine minutely the condition of the external auditory canal, first syringing out the tube with tepid water, and then submitting every portion of it to the action of strong light through the tubular speculum. In the early stage, and in the mildest form of this complaint, all that we may be able to discover is a pinkish, vascular, slimy condition of the lining of the whole tube and external layer of the membrane of the drum, which latter is thickened and opaque, and has almost invariably a fasciculus of red

vesicles coursing along the line of the malleus. In simple external otorrhœa, I generally paint the surface engaged with a solution of nitrate of silver, ten grains to the ounce, with a fine camel's hair pencil, or a bit of cotton on the end of a probe, which I find far preferable to the old practice of dropping in the solution; as, by thus rubbing it on the parts, some more and some less, according to their condition, it removes a quantity of the mucous discharge, which adheres with great tenacity, and thereby makes its effect more certain; it may also be required on some particular spots only; and moreover, by this method the concha, external parts, and the dress, are not blackened by it.* This application should be repeated every second day, and, in the interim, the ear should be syringed night and morning, and even oftener if the discharge accumulates, with plain tepid water, from a gum elastic bag, which, when used by friends or attendants, or the patient, is much preferable to the usual piston syringe; and at night a slightly astringent lotion may be poured into the ear till it fills up the meatus, allowed to remain there for a few minutes, with the head bent to the opposite side, and then permitted to run out. The syringing must not, however, be over-done: as soon as the discharge begins to moderate, it should be had recourse to less frequently; for if not, it will, particularly in the hands of attendants, serve to keep up the irritation.†

The various salts which enter into the general composition of eye collyria are here particularly applicable, especially those of

* It was with considerable surprise I read an article by Dr. Bonnafont in the *Gazette des Hopitaux*, recommending a *powder of nitrate of silver to be blown into the ear*, for the cure of ulcerations attending otorrhœa. With still greater wonder and regret have I seen such practice quoted and recommended in British journals. A more empirical procedure, except that of a farrier blowing powdered white sugar and quicklime into the eye of a horse, to cure it of the "Haws," I never knew advocated. With as much reason should powdered caustics be blown up the vagina, or the rectum, or into the throat or nose, or into the eye, to cure a spot of ulceration on these parts, as into the ear; and with as much ease, certainty, and security can an ulcer in the auditory passage, or on the membrana tympani, be touched with caustic, either in substance or solution, without injuring the adjoining surfaces, as into any of these cavities.

† Many patients imagine they can syringe their own ears; but we have only to look at their attempts to do so to see how ineffectual they are.

alum, lead, zinc, and copper. I formerly employed the lead lotion very extensively, but I have found that it frequently, even without coming in contact with diseased bone, produces a blackened discharge: when it is used, the liquor plumbi will be found the safest and most efficacious preparation; and the lotion may be preserved clear, and either rose or elder-flower water employed, by the addition of a few drops of acetic acid. The liquor aluminis compositum of the London Pharmacopœia is that which I now most frequently prescribe. Solutions of tannin will also be found useful astringents.

If upon examination we find the meatus thickened, and it and the surface of the membrana tympani pink and vascular, a leech or two, according to the age and strength of the patient, should be applied every third day, several times. When the discharge is fetid, a chloride of lime lotion used occasionally is of service, being slightly astringent, and correcting the disagreeable smell.

With regard to cleanliness and syringing, so very much depends upon it, particularly among the lower orders, that the surgeon never can sufficiently impress its importance upon the patient or the attendants. In simple mucous discharge, without polypus, granulations, or affections of the deep-seated structures, it is the chief part of the treatment; and yet how difficult to have it performed regularly! Allowing the discharge to accumulate is undoubtedly one of the principal means of perpetuating otorrhœa in any of its forms. When the meatus becomes a secreting cavity, with ulceration of its walls, it resembles a fistula, and the longer it has existed the more difficult it is to heal; and this fistulous character, especially in a narrow passage, promotes the continuance of a slight thin discharge, even long after the granulations or other producing causes have been removed. The action of the external air, therefore, upon this secreting surface, similar to what it experienced in health, can never be too much observed. There is, however, a very general prejudice to the contrary; for in two-thirds of the cases of otorrhœa which I am called on to treat, I find the orifice of the meatus filled full of cotton or black wool, which, if treatment be employed, is invariably restored to its position after each syringing. Some time ago I was consulted on account of a

discharge from the ears of Master C.; it was then of two years' standing, and was thin and whey-like. He had been under medical treatment during the entire course of the disease; generally made use of syringing, and an astringent wash; never ceased to take tonic mixtures and aperient powders, and had resided twice at the sea-side. On examination, I found the auditory passages converted into secreting cavities, but without fungi, granulations, or caries, and with the tympanal membranes still perfect, but I learned that he had worn plugs of cotton in his ears ever since the discharge commenced; and these were only removed once in every two days in order to syringe and apply the lotion! By throwing aside the plugs, syringing twice a day, and continuing the same astringent applications, the child was cured in a month. It is scarcely necessary to add, that the moment the ear-passage becomes a muco-secreting surface, all traces of cerumen vanish, and it is not in the generality of cases until months after the discharge has ceased that the wax re-appears.

With regard to general treatment, a very remarkable difference seems to exist in this country in relation to the management of the diseases of the eye and the ear; that of the former being of too local a nature, while that of the latter is almost exclusively constitutional. How frequently do we see a case of pustular or rheumatic ophthalmia, with a foul, white, loaded tongue, treated by a caustic solution dropped into the eye, or an astringent lotion applied to the eyelids—while a case of otorrhœa, without any derangement of the digestive functions or general health, is recommended tonics, sea-bathing, blistering, and an issue in the arm. If the case is curable,—for it must be borne in mind that only a certain number of those presenting with discharge from the ear are amenable to treatment,—and that we have fully ascertained the cause and source of the otorrhœa, and have reason to believe, from the appearance of the patient or the history of the case, that the state of constitutional health assists to keep up the local disease, we should by every means endeavour to act on the system. Cod-liver oil and Peruvian bark are the remedies which I have found most conducive to this end: the former as an anti-strumous fattener; the latter by altering the established tendency to morbid secretion;

but notwithstanding that otorrhœa of long standing is reputed to be entirely a constitutional affection, I have seldom occasion to prescribe any course of alterative medicine, unless in cases of marked strumous habit, and when the glands of the neck are diseased. With regard to "drains" and counter-irritation, we may insert an issue in the arm, if only to meet the prejudices of the friends or medical attendants; but sometimes cases occur that of themselves not only warrant but demand such a precaution; for instance, where disease of the brain had appeared in other members of the family, or that the aural discharge had broke out on the subsidence of disease of the skin or any vicarious outlet, or that the child had had convulsions in infancy, &c.; but these are the exceptions to the rule.

Towards the close of an otorrhœa from simple chronic otitis, especially in children, I have frequently remarked, that they are liable to slight fresh attacks of otalgia, and sometimes small abscesses form round the mouth of the meatus. These are, I believe, best warded off by the application of a vesicating liniment behind the ears, and keeping up gentle counter-irritation for some little time after the otorrhœa has ceased. For this purpose the croton oil dissolved in soap liniment, or the tincture of iodine, made stronger and more soluble by the addition of a little hydriodate of potash or the acetum lyttæ, answers very well.

When an otorrhœa of long standing, from whatever cause it has arisen, is ceasing, either spontaneously, or as the result of treatment, I have found, in a great number of cases, that the dermal lining of the auditory canal becomes enormously thickened; and the cuticle, which is now re-developed, and of a white colour, very like the appearance of the hands when long exposed to the action of hot water, as in washing, is thrown off in patches, and often fills up the passage completely. Such was the condition, and such the stage of the disease, presented in the case of an officer who had been affected with an otorrhœa from his childhood, described by Mr. Earle in the tenth volume of the Medico-Chirurgical Transactions. To that case, so admirably described, and so judiciously treated, I would refer my readers, as a type of the mode in which simple chronic otitis ends. Such a case need not, in

the present improved state of aural surgery, require such lengthened treatment. After syringing the ear well, all the thickened cuticle that remains may be easily removed through the speculum with the spatula and the slender forceps figured at page 182; the parts may then be touched with a solution of lunar caustic, and when the discharge has ceased, and the cuticle has become thinner and less white, the cure may be completed by the application of ung. hydrarg. nitros dil., laid on warm with a camel-hair brush.

When an otorrhœa has ceased for a time, particularly where the tympanum is open, a thick crust of inspissated mucus, like that which sometimes grows in the nose in cases of ozena, fills up the bottom of the cavity of the meatus, often resembling the end of a thimble,—as soon as it becomes dry and hard, it acts as a foreign body, giving rise to "itching, and a feeling of stuffing and great uneasiness in the socket of the ear," as patients frequently express themselves. These crusts—of which many instances will be found among the cases in the Ear Registry—must be cautiously removed from time.

The complications that render otorrhœa at all times tedious, and always difficult to heal, are morbid vascular growths; of these, *Granulations covering over the face of the membrana tympani* are not unfrequent. In such cases the bottom of the auditory tube will appear as red and vascular as a granular eyelid, and it is to an unpractised eye difficult to know whether it is the surface of the membrane or the inner wall of the tympanum that is seen. A simple inspection, by means of a strong light, will generally determine this; for although the greater portion of the membrane of the tympanum may be destroyed, and even the incus cast off, still the malleus, in the great majority of instances, remains. A fine probe, such as that described at page 300, will, by one touch, determine whether we are percussing a thickened membrane or the promontory of the middle ear. Making the patient press air into the ear by a forced expiration, or, again, by the fluid of the injection passing into the throat, we may judge of the perforated condition of the membrane. But as it often occurs in otorrhœa, where the cavity of the tympanum is exposed, that the Eustachian

tube is likewise blocked up with granulations, or closed by inflammation, neither of those two methods are always applicable. In the latter case, injecting fluid through the Eustachian tube is likewise inapplicable. Wherever the granulations grow from, whether from the membrane itself, or from the walls of the tympanum, the means I find most useful for their eradication is the solid nitrate of silver rubbed over the part every second day, or oftener if necessary, with the instrument represented at page 304.

Of the many hundred cases of otorrhœa which I have examined during the last twelve years, I have never seen one in which a polypus grew from the surface of the membrana tympani. Of perforation of this membrane, from a small aperture to its total destruction, as well as of the value and mode of applying an artificial membrana tympani, or, rather, a substitute for that structure, I have already written at length in the section on that subject at page 298.*

POLYPUS.

Morbid growths, denominated *Polypi*, are a frequent complication of otorrhœa; they may occur at any period of the discharge; as, after otitis of a month's duration where the membrane has been perforated, or in the advanced stage of chronic catarrhal inflammation, with a perfect membrane, and of many years' standing. They vary in size from that of a small split-pea to such a magnitude as completely to fill the external auditory passage, and to project considerably from the outer aperture; but at times they are so small, and lie so much concealed in the large anterior sinus at the bottom of the auditory passage, that they may, with a person not accustomed to aural examinations, escape detection. They are always accompanied by discharge, and are frequently the chief source of such. Fleshy, pedunculated, morbid growths in the ear, nearly colourless, having a thin, cuticular covering, unattended by pain, not appearing as the result of inflammation, and unaccompanied by discharge, are, in comparison with those to which I

* Since Chapter IV., alluded to above, went to Press, a claim has been raised on behalf of Mr. Tod for the discovery of a succedaneum for a lost or perforated membrane; but I see no reason to alter what I have already written on the subject.

have so frequently alluded, and am now about to describe in detail, extremely rare. Throughout this essay I have employed the terms fungus and polypus as indicative of those morbid growths, the product of inflammatory action and long-continued otorrhœa. By fungus, however, I particularly allude to those vascular and granular masses which generally grow either from diseased bone, or after the destruction, in whole or in part, of the membrana tympani, and the attachments of which are to be found principally at the very bottom of the auditory passage in the tympanum; while polypi are, for the most part, confined to the glandular portion of the tube, about midway between the external orifice and the membrana tympani, and are attached by narrower roots than the fungi.

In eight cases out of a dozen these polypi sprout from the site of the cerumenous glands in the posterior wall of the meatus; they generally grow singly, but I have, on some rare occasions, seen two attached to different parts of the meatus; they may co-exist with a granular state of the membrana tympani, or with fungous vegetations proceeding from the middle ear; sometimes they are pedunculated, and at others attached by a large base. When in cases of perforated membrane, a polypus springs from the cavity of the tympanum, and passes through the aperture, it always forms a nail-like or mushroom head, which, spreading over the outer surface of the membrane, is very deceptive, and gives the appearance, particularly in a long and tortuous meatus, of an open tympanic cavity;—such growths can, however, be always lifted off the membrane by means of a probe or spatula. These latter are, I believe, the instances which authors have mistaken for polypi growing from the surface of the membrana tympani itself. In colour polypi are generally a florid red, smooth and polished on the surface while still within the meatus, and generally immersed in the discharge; but as soon as they appear externally,—and I have seen them grow to such an extent as to mould themselves into the concha,—they become pale, cuticular, and comparatively insensible. Their sensibility is not very great towards the free extremity, but it always causes more or less pain to touch them at the root. In form they present many varieties, from that of a split-pea, or a

small ovoid body, attached by a peduncle on its flat surface, to a lobulated mass, not unlike a bunch of grapes, and divisible, by deep sulci, into a number of minor bodies, as shown in the first figure in the accompanying illustration, which represents the principal varieties of this disease, of the full size.



This form of vegetation is always more friable and gelatinous, it is generally of a light pink or salmon colour, and is usually paler than either the foregoing or the preceding. Whether they all proceed from the same original source, and present at first the pea-like body, or small globular mass, subsequently modified according to the condition of the ear, the peculiarity of the patient, or the duration of the disease, has still to be determined.

The third form is also lobulated, as shown in the second figure; but it is of much firmer consistence than the second; the lobules, however, only exist upon the surface, and resemble more the external characters of a lobulated kidney, or a brain,—the sulci which divide the granulations being very shallow. It is generally of a fibrous character, difficult to be cut through with a wire, and has always a firmly attached, extensive base.

The fourth description, represented by the third figure, is also firm and fibrous in its structure, though not so much so as the foregoing, from which it differs by its invariably uniform surface; it is seldom of so florid a red as No. 2 in the cut, but is the third most frequent kind which I meet with. Its base is always extensive, and in the instance represented, its surface was traversed by several superficial vessels.

The fifth description, shown by the fourth figure, is a very

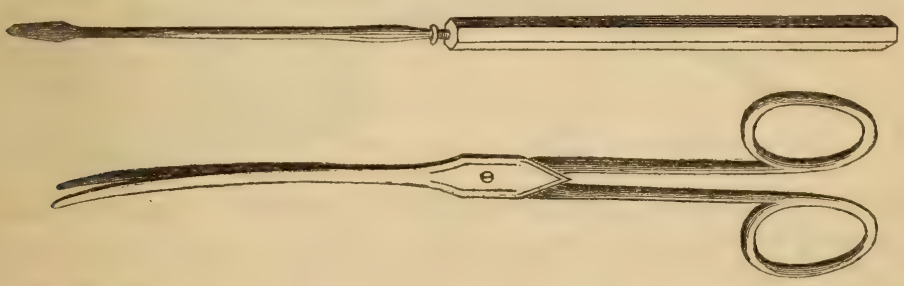
rare variety of the disease, and may, from its shape, be denominated peariform. In the case from which the foregoing illustration was made, the globular extremity of the mass projected from the external aperture, and was about as florid as the red border of the lip; it was also dry and cuticular, and accompanied with but little discharge; it grew from the anterior wall of the meatus, was remarkably tough and unyielding, and came away with its extensive base and roots, as shown in the engraving.

All these polypi are highly vascular, but the first, and to a certain extent the second also, are much less so than the others. The sixth form of polypus is malignant, of which I have given an instance at page 206; it is of a much more livid colour, and, though not friable, has a peculiar flabby feel. In each of the cases which I have seen, it was remarkably fetid; parts of it became the colour of a ripe plumb, sloughed, and hemorrhage followed, long before the true malignant nature of the disease became apparent.*

* Mr. Toynbee, who has written a series of practical articles upon polypi of the ear in the Medical Times and Gazette during the course of last year, divides these bodies into the vascular polypus, which is "of a red colour, plentifully supplied by vessels, and so soft that, upon being taken hold of by a pair of dressing forceps, it breaks up, and blood escapes from the lacerated surface. It is composed of small rounded cells, and its surface, which is sometimes covered by ciliated epithelium, is very smooth and shining." He also says, that this form "rarely increases to so large a size as to *dilate* the meatus," from which it would appear that polypoid growths possess the power of enlarging the caliber of that tube; but this I do not find they ever do until they have first completely filled it and presented externally, when, their growth in that direction being checked by the astringent action of the atmosphere, they may, perhaps, have this effect. In simple otorrhœa, however, when of long standing, and accompanied by a thin, brownish, and ichorous discharge, even without the complication of polypus, the external meatus is frequently enlarged, and presents a ewer-like mouth. Mr. Toynbee's second form is the gelatinous polypus, a name which, he says, "has been given to it from the soft jelly-like appearance presented by its free portions, and from the similarity of their general aspect to the gelatinous nasal polypus," which, as every surgeon is well aware, is of a grayish colour and semitransparent. The author says that, when examined under a microscope, "interspersed throughout the substance of the polypus were many spindle-shaped crystals." I cannot say that I am acquainted with this variety of the disease, nor have I ever removed a polypus from the ear that was not of a red or pink colour, although it became pale soon after extraction. The author's third form, and which, he says, has not hitherto attracted the attention of surgeons, he has styled "the globular vascular polypus;" this corresponds with that which I have described as No. 1, and is the most frequent form observed in children, and as the sequel of otitis in grown persons.

Polypi continue for years, and seldom or never cure spontaneously, or by what is termed "an effort of nature," and so long as they exist, otorrhœa will continue. From so little having been said about them in foreign works, I presume they are not so common in other countries as in this; as in 647 cases of otorrhœa enumerated in the Table at page 102, as many as 64 were complicated with polypi.

The treatment of this disease consists in the removal of the morbid growth; the employment of such measures as shall prevent re-vegetation,—for it is most apt to return, and it grows with great rapidity,—and in giving a healthy action to the neighbouring parts. The destruction of a polypus may be accomplished by incision with either a fine double-edged knife, or a curved slender

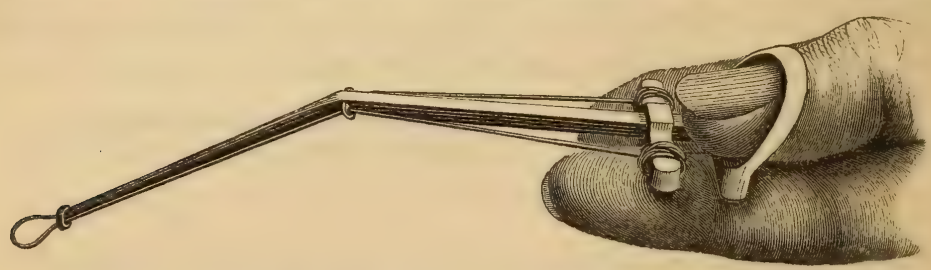


scissors, such as those here figured; but this mode of removal is only applicable to small pedunculated bodies near the external margin of the meatus; and I now very seldom have recourse to cutting instruments of this description.

For the removal of polypi and other fungous growths, various mechanical means have been devised, in the shape of forceps and ligatures, &c. Without entering into an historical description of all these, it is enough to remark, that they were insufficient for the purpose for which they were invented; the former instruments owing to the brittleness and vascularity of the substance they were intended to grasp; and the latter from the difficulty of applying them with accuracy to the root or foot-stalk of the morbid growth, Our first object must be to obtain as accurate a knowledge as possible of the particular point from which the polypus proceeds, by passing a probe or spatula round its base; when, if it is of small size, globular form, and not very deeply seated within the meatus, as is sometimes the case, it can frequently be removed with

the long curved scissors (figured on the preceding page) half an inch of the points of which alone are cutting, and the whole of which measures five inches; or by the small double-edged knife; or the curved one represented at page 296; all of which, as well as the toothed forceps, can, when the growth is of small size and fully exposed, be used with freedom and effect through the tubular speculum. These instruments are figured a third less than the natural size.

The best instrument for the removal of aural polypus from any portion of the meatus is the small snare-like apparatus here represented, consisting of a fine steel stem, five inches long, and



bent in the centre, for the reasons explained at page 57; with a moveable bar sliding on the square portion near the handle, which latter part fits over the thumb, as shown in the cut.* The upper extremity is perforated with holes running parallel with the stem; and loops at the angle serve the same purpose. A fine wire, fastened to the cross bar, passes through these loops and holes; it should be of such a length that, when the cross bar is drawn up tight to handle, the ligature is fully on the stretch. Having tried wires of different materials,—silver and platina, and of various degrees of strength and flexibility, I have found that fine steel wire of No. 24 grist, with the temper taken out of it by heat, is far the toughest, most flexible, and least apt to cut. In making this instrument, the loops at the side and the holes at the top should be very smooth, and their edges bevilled off, so that the wire will not scrape or cut in running through them. The thumb piece and

* For the history of this instrument, see the author's Essay upon the Causes and Treatment of Otorrhœa, page 52; and also that upon the Inflammatory Affections of the Membrana Tympani and Middle Ear, page 10,—both referred to at page 51 of this work. This snare removes gelatinous polypi from the nose with much greater facility, and with very much less pain and injury to the parts, than the ordinary forceps used for that purpose.

cross bar may be formed of German silver. In using it the cross bar is pushed forward, and a noose made of the wire at the small extremity, of sufficient size to include the morbid growth, which it is then made to surround, and towards the root of which it is pressed by means of the stem; the cross bar is then drawn up smartly to the handle, while the point of the stem is pressed downwards; and it never fails of either cutting across or of drawing with it whatever was included in the noose. Bleeding generally follows, upon the subsidence of which we should syringe the canal with tepid water, and again examine the ear, and if possible discover what portion of the polypus may remain, which, whether it be the mere point of attachment, or a portion inaccessible to instruments, should be touched with the armed *porte-caustic*, and the same application applied from day to day until all traces of the morbid growth have vanished. Unless this latter point of practice be strictly and perseveringly adhered to, it is in vain that we can expect a total eradication of the disease; no more however, of the auditory apparatus should be submitted to the action of the caustic than the actual granulating or fungous surface. I have frequently seen the whole canal in a state of ulceration, and an erysipelatous inflammation extending over the entire auricle, from a stick of lunar caustic having been inserted into and rolled round in the meatus to remove a polypus or fungous growth, the eradication of which had already been frequently attempted by instruments; a practice as cruel as it was ineffectual.

Some practitioners prefer the potassa fusa and various other caustics for the removal of these growths; but, with respect to these and all other remedies of a like character, I can only say, that after a very extensive trial during many years of the snare and the solid nitrate of silver, I have never found them to fail in eradicating polypi, no matter of what description.

Dr. Evory Kennedy, in his paper upon uterine diseases,* recommends the use of the nitrate of mercury in the treatment of polypoid growths and ulcerations of the os uteri; but my experience of all such applications to the ear is, that they are too deliquescent,

* See Dublin Quarterly Journal of Medical Science for February, 1847.

and their action cannot always be limited. Astringent lotions will not cure aural polypi.

CARIES.

The third and most frequent complication and consequence of otorrhœa is *caries*. *Necrosis* of the bony case of the ear is not an unfrequent, and is always a dangerous, attendant upon, or a source of, aural discharge, but here a doubt arises as to what the original disease was,—whether it proceeded from otitis, spreading to the periosteum, and thence to the bone,—or from inflammation of the mucous membrane extending from the drum into the mastoid cells. This latter mode is what I believe frequently takes place in those cases when, after the continuance of otorrhœa, the mastoid process comes away; and there are several pathological specimens which tend to confirm this view.

Instances of the loss of the whole or a portion of the mastoid process are by no means uncommon; the preparation represented



in the accompanying wood-cut, and which forms the entire bulk of the mastoid process, a large piece of the petrous portion of the temporal bone, including the posterior wall of the middle ear, and one of the semicircular canals, was removed in my presence from a child three years of age, by Mr. Cusack, in the Dispensary of Steevens' Hospital, in the year 1833. Having had charge of that case for a considerable time subsequently, my attention was then first called in an especial manner to aural affections. Cases of this description, however, the result of extension of disease from the meatus and middle ear, are not to be confounded with inflammation of the periosteum of the mastoid process, occurring idiosynchronously, nor of abscess taking place underneath it, nor between the dura mater and the bone, upon a corresponding portion of the internal surface of the cranium.

The splendid pathological collection of the Richmond Hospital, in this city, contains five most interesting and valuable preparations of disease of the temporal bone, and one of these is in exact accordance with the view which I have expressed above. The

subject of this affection, aged 16, was idiotic, and nearly deaf and dumb. For some months previous to her death she had pain in and semi-purulent discharge from both ears, and was also frequently attacked with fits of epilepsy. Death took place suddenly. Professor Smith, who laid the case before the Pathological Society, stated, that on the right side, the membrana tympani, the malleus, stapes, and incus were all destroyed, and the mastoid cells contained purulent matter. "The left side presented a very remarkable specimen of disease of the mastoid and petrous portions of the temporal bone. Above the meatus the temporal bone was perforated by a large opening, which communicated on one side with the cavity of the tympanum, and on the other with the mastoid cells. All the partitions of the mastoid cells were destroyed, and the whole cavity thus formed was filled with fetid pus, mixed with particles of carious bone. The purulent matter had also penetrated into the vestibule, the cochlea, and the aqueduct of Fallopius. The foramen rotundum, and fenestra ovalis, were thrown into one large opening. On tracing the nerves, it was found that the portio dura, where it passes through the aqueduct of Fallopius, was covered with lymph and purulent matter of a greenish hue. The dura mater covering the anterior surface of the petrous portion of the temporal bone, was slightly discoloured, but there was no pus in the vicinity. The great lateral sinus upon the same side presented the appearance of commencing inflammation; the lining membrane was of a dark-green colour, and the blood in the sinus was coagulated. There was in this case no paralysis or distortion of the face."

Had injections been used in this case, or had art interfered with it in any way, and had no examination been made after death, it would, among the disciples of Itard, have been set down as one manifesting the deleterious effects of stimulating applications; or, had even milk been injected, it would, as well as the linseed oil already referred to, have been forthwith expunged the aurist's pharmacopœia.

Instances of caries of the temporal bones producing death, as the *effects* of otorrhœa, might be multiplied without end. The preparations in the Richmond Museum exhibit the process of the

inflammation, death, and separation of the bone in its various stages, all sooner or later affecting the head. In these, and I am led to believe in the great majority of other instances also, the destructive process had proceeded *from without inwards*, and what was originally an otorrhœa from an inflamed mucous and periosteal membrane spread from thence to the bone itself.

A very remarkable case of otorrhœa and death caused by caries of the petrous portion of the temporal bone, has been recorded by the late Dr. Graves.* The subject of it was a scrofulous boy, ten years of age, who was admitted into hospital for dropsy and diarrhœa, of which he was relieved—"when it was observed that there was paralysis of the right side of the face, but obvious only when the muscles of the face were in action. Thus the attempt to close the eye failed on the affected side. There was a discharge from the ear of the same side, which *originated seven years previously*. The opinion formed of the case was, that there was disease of the petrous portion of the temporal bone, and that with this was connected the affection of the portia dura of the seventh pair, from which the paralysis might be considered to result. There was pain in the head to the right side, which after some time changed its place, and moved to the back of the head, and from this time the discharge from the ear ceased. The pain then moved down the spine. A few days before death there were tetanic convulsions, and an extreme sensibility of the entire surface of the body. Three years before there had been similar convulsions. The power of locomotion and the intellect continued to the last unimpaired. During the few days which intervened between the first appearance of the convulsions, and his death, they had recurred five or six times. The body was examined after death. Within the skull a perforation was observed in the dura mater, immediately opposite to the aqueduct of the vestibule, in the petrous portion of the temporal bone, which was

* It is with heartfelt sorrow I have now to speak and write of Dr. Graves in the past tense. Since my previous notice of this distinguished physician, the science of medicine at large, and the Irish nation in particular, have experienced a loss which is not likely to be replaced in the lifetime of the present generation; and the author has been deprived by death of one of his earliest, firmest, and best of friends.

carious. A green fetid pus detached the dura mater from the bone in this situation, and also bathed the nerves at the base of the brain. The membrana tympani and internal ear had been destroyed. The brain itself appeared healthy. The theca of the medulla spinalis was filled with pus, but the medulla itself (of which Dr. Graves exhibited a drawing) appeared healthy, and the attachments of the ligamentum dentatum were all perfect."

There can, I think, be little doubt but that the caries in this instance was a secondary affection, arising from extension of the original otitis, and had that disease been properly treated at the commencement, it is more than probable that the caries would never have supervened. From this case we also learn how, when dangerous symptoms follow, the discharge ceased, not from any metastasis, but in all probability by the matter not finding a ready outlet through the carious portion of the temporal bone, having fallen into the theca vertebralis, and pressed upon the spinal marrow; and this accounts likewise for the removal of the pain to the back of the head and down the spine, as detailed above. In the case related, fortunately for the cause of aural surgery, injections were not had recourse to. I have given an instance of caries of the internal ear at page 376.

LESION OF THE FACIAL NERVE.

Facial paralysis is a frequent result of otorrhœa and caries of the temporal bone, and is, I have reason to believe, produced by absolute lesion of the portio dura, from ulceration extending through the diseased aqueduct of Fallopius. This form must be carefully distinguished from inflammation extending to the neurilemma, and perhaps the nerve itself, from otitis or myringitis, as I have shown at page 347. Mr. Hamilton, of this city, has recorded one of the best-marked cases of actual division of the facial nerve by extension of disease from the temporal bone. The patient, a man aged 55, had otorrhœa with paralysis of the right side of the face and difficulty of deglutition. He died apparently from disease of the brain; and the post-mortem examination showed extensive inflammation of that viscus and its investments. The petrous bone presented the usual greenish colour on the inner sur-

face; it was also carious, and its structure infiltrated with fetid pus. The facial nerve could be traced from the internal meatus to the carious part of the bone, where it ended, and there was a deficiency between it and the lower portion, to the extent of one-eighth of an inch. "The nerve could be traced from the meatus internus to the carious part of the bone, where it ended; and in like manner it could be traced from the stylo-mastoid foramen up the Fallopian canal to the situation of the caries, where all traces of its original structure were lost. There was a difference between the two portions of the nerve; the upper portion was more vascular, and ended in a small bulb; the lower portion was pale, and apparently natural."*

In some rare instances of double otorrhœa, *facial paralysis occurs on both sides*, and then the appearance of the patient is truly remarkable: there is a preternatural fulness of both cheeks, a droop in both lower eyelids, and also in the external angles of the mouth; but the most singular appearance is an unusually vacant stare and inexpressive character of the whole countenance. A case of this nature has been recently afforded me by Dr. Frazer. The patient, nine years of age, had morbus coxæ for some years, when strumous otorrhœa occurred on both sides, attended subsequently with paralysis of one side of the face, and in some time afterwards the other side became similarly affected: "The double paralysis produced a remarkable absence of all expression in the face: the features, which were before extremely intelligent, resembling very much those of a much older person in a state of complete repose. The masseters and pterygoids were not affected. He finally died of cerebral disease."

CEREBRAL AFFECTIONS CONSEQUENT UPON OTORRHŒA.

Under the head of "cerebral otorrhœa," head affections consequent on discharge from the ear, extension of inflammation and caries of the temporal bone, and metastasis of aural affections to the brain and its membranes,—the profession has been well ac-

* Proceedings of the Pathological Society, in the Dublin Journal of Medical Science for July, 1841, pp. 458 and 472.

quainted for several years past with one of the most fatal results of this disease. Cases illustrative of this question have been accumulating from year to year since the writings of Abercrombie and Lallemand, &c. appeared; and the Transactions of the Pathological Society of Dublin* record many instructive cases which bear upon this subject, with which, as may naturally be expected, I am familiar.

Mr. Toynbee, in a communication recently made to the Medico-Chirurgical Society of London, upon the affections of the ear which produce diseases of the brain, and to which I have already drawn attention at page 197, has, with the exception of those above alluded to, tabulated the various cases related in medical or surgical records.† I may, however, be excused remarking, in connexion with this subject, that I had previously drawn attention to the subject in January, 1844, and related some of the cases which had then occurred in this country. That caries of particular portions of the bony case of the ear may give rise to disease in special parts of the brain, or its membranes or the cerebral sinuses, I do not deny; but I must confess that as yet the details of cases are not sufficiently conclusive to enable me to decide with certainty on this fact; and of this any one can judge who will carefully examine the Table given in the Medico-Chirurgical Transactions.

A case of otorrhœa may continue for years without causing greater inconvenience than the loss of hearing and the pollution from the discharge; the patient, however, becomes suddenly unwell; he generally has a shivering which is attributed to cold; and after that irritative fever sets in, pain is experienced deep in the ear and over the side of the head; and in some cases, but not all, a soreness is felt on pressing the mastoid region or anywhere around the attachment of the auricle. The patient takes to bed; sleeplessness is almost invariably experienced; incessant delirium follows, from which,

* It is much to be regretted that the Pathological Society of Dublin have not published their valuable Transactions separately; as, until they do, the materials contained in their weekly numbers, although preserved in one of our periodicals, is, to a certain extent, inaccessible to the profession.

† Mr. Toynbee had added to his former communication a paper "On Disease of the Internal Ear, extending, through the medium of the auditory nerve, to the medulla oblongata and base of the brain," in the London Journal of Medicine for August, 1852.

however, the patient can be roused and induced to answer questions rationally; there is always present a weight in the head, the person does not like to be disturbed, and shows great disinclination to be lifted into a semi-erect posture. From about the period of the commencement of the attack the discharge from the ear generally lessens, but seldom altogether ceases; and I have in some cases seen it continue throughout the disease as profuse as ever. Fresh rigors ensue, characterized by nervous symptoms of a peculiar character: such as unconsciousness, strabismus, and even convulsions, subsequently all the symptoms of inflammation, effusion, and suppuration within the cranium, supervene. The train of nervous symptoms which follow are often anomalous; and the paralytic affections which succeed are of an extraordinary character, and can with difficulty be explained according to our present notions of the physiology of the brain and spinal marrow. Daily rigors, convulsions, coma, and death, sooner or later close the scene. The course of the disease is, however, very various; by the prompt application of remedies—mercury internally, local depletion and counter-irritation externally, and by a free incision timely made over the painful spot, when such presents over the mastoid process or elsewhere—I have seen the disease arrested; but more frequently the relief is only temporary; and this insidious affection proceeds with a slow, latent course, even after an apparent convalescence, to a fatal termination.

Upon examination after death it will be found that the dura mater has been separated, to a certain extent, from the petrous portion of the temporal bone, and that the space so caused is filled with greenish serum, while the bone itself, at that spot, is of a dark greenish hue, but still unbroken. The bone may, however, have been carious, and the head symptoms may have resulted from diffused inflammation of the membranes of the brain, or abscess in the cerebrum or cerebellum.

These cerebral symptoms do not, however, in every case, appear to be the immediate cause of death. I remember two cases in particular, and I suppose they are the types of many others of the same class, where the lungs became affected in the latter stage of the disease, and in which the thoracic affection seemed to be

the immediate cause of dissolution. In both, considerable swelling of the neck occurred along the course of the mastoid muscle, extending from the ear to the clavicle; in one of these, which I attended along with Mr. Cusack and Dr. Stokes some years ago, a large abscess formed over the site of the jugular, and the patient died of mortification of the lung; in that instance the fetor from the breath was most intolerable. In the other case which I attended, within the last month, along with Mr. Cusack and Dr. Newland, there was, from the first, considerable swelling over the side of the neck, extending from the post-aural and occipital region to the clavicle; the patient died apparently from the pulmonary affection, and with the same fetor of the breath as that already alluded to. In such cases I am inclined to think that the disease of the petrous bone extends to the lateral sinus, and induces purulent infection of the venous system, which eventuates in disease of the lung. A similar case, bearing out the pathology of this affection, was laid before our Pathological Society by Professor Smith in 1840. A boy, aged 16, had otorrhœa, and in process of time head symptoms set in. He had shiverings, uncertainness of gait, vertigo, dilated pupils, nausea, pulse 132, and pain in his right ear and in the back of his head. After admission into hospital he slept but little, had frequent startings, moaning, and complaining of acute pain in the ear,—" whenever he attempted to rise he supported his head with his hand," which latter symptom of a feeling of weight and a dislike to move the head is an invariable attendant upon cerebral symptoms consequent upon otorrhœa. An incision was made over the mastoid process, when a little fetid matter was given exit to, and the bone was found denuded. He subsequently became jaundiced, and " had likewise cough, which was very distressing, accompanied by severe pain along the right side of the neck." He died comatose eight days afterwards. The membranes of the brain were injected with blood, especially along their inferior surface. Three small purulent deposits were found at the inferior surface of the right lobe of the cerebellum, where it corresponded to the lateral sinus; the dura mater was separated by pus and lymph of a green colour from the anterior surface of the petrous bone; there was no perforation of the membrane, but

over that portion of the bone which constitutes the superior wall of the tympanum it was elevated into a small tumour by a collection of fetid matter, and presented a sloughy aspect. The portion of bone corresponding to this abscess, for about one-fourth of an inch in diameter, was dead, and of a dull white colour. The process of separation was at one point complete, the aperture thus formed communicating with the cavity of the tympanum; the remainder of the bone was remarkable for its vascularity. The membrana tympani had disappeared altogether; the membranous walls of the right lateral sinus, throughout the whole of the mastoid portion of its course, were much thickened, and their lining "presented a sloughy appearance, being covered with lymph of a greenish hue, and smeared with an unhealthy, purulent matter. This condition of the lining membrane extended along the jugular vein and superior vena cava to within a short distance of the entrance of the latter into the auricle; the lining membrane of the remainder of the vena cava was of a dull tawny colour." The thorax was carefully examined, and the following appearances noted:—"The left cavity of the pleura contained about four ounces of thin fetid matter, and a yellow tenacious lymph adhered both to the costal and pulmonary layers of the membrane. Similar appearances were noticed in the right cavity of the pleura, but not to the same extent; the lungs were solidified in the postero-inferior portions, and small circumscribed deposits of purulent matter were scattered through them; these deposits were contained in cavities lined by a smooth membrane, and in two instances a small branch of a vein was distinctly traced opening into them; these veins were inflamed; lymph was deposited upon their exterior, and purulent matter was contained within them; there also existed in the left lung three large spots, resembling pulmonary apoplexy; these were as large as a walnut, firm, of a livid blue colour, and blood exuded from them upon pressure; the lining membrane of the smaller bronchial tubes was intensely vascular, the pericardium contained about three ounces of serum, and flocculi of lymph were seen upon the surface of the heart, chiefly upon the right auricle."

I have quoted the foregoing minute autopsy at length, as it is

the only one I am acquainted with in which the condition of the heart and lungs had been carefully described. In that case it is quite manifest that the pulmonary affection could be traced to the disease in the ear, the phlebitis set up in the lateral sinus having extended to the large vessels, and the heart and lungs. Dr. Watson, of London, has related some instances of this nature.

Sometimes there is an aperture in the dura mater communicating at the diseased part of the bone with an abscess in the brain. The last case which I had an opportunity of examining, and for which I am indebted to Dr. Banks, is as follows:—

"A sweep, aged 21, was admitted into the Hardwicke Hospital in January last; five days previously he had a severe rigor, which was succeeded by intense headach, chiefly referable to the frontal and parietal bones, and was much aggravated when the patient assumed the erect position; there was a purulent discharge from the right ear, but which the man said 'was of no consequence, as it had existed since he was ten years old, without causing any inconvenience except deafness;' pressure over the parotid region caused pain. The patient seemed listless and drowsy, and required to be questioned loudly before he answered; the pupils were dilated; the pulse only 54, and intermitting. His head was shaved and blistered, leeches were applied to his temple, and he was put upon the use of mercury. Ten days subsequently all his symptoms had increased, and continuous delirium ensued, but he was not unconscious, and could be roused when spoken to. On the thirteenth day after his admission, and the eighteenth from the date of the rigors, he had low, muttering delirium, continuous tossing of the hands and rolling of the eyes; and he died without having convulsions." The following was the post-mortem appearance. "On opening the skull lymphy pus was found effused around the pons and medulla oblongata. The dura mater was separated from the petrous portion of the temporal bone by purulent matter; that membrane adhered to the brain, and, when separated, an opening was produced in it, and also in the cerebral mass, which led into an abscess, containing fetid green pus. The abscess, which passed upwards, opened into the inferior cornu of the lateral ventricle, which was filled by a sero-purulent fluid, and lined by a vascular

secreting membrane. The pus then passed into the opposite ventricle, and down through the third and fourth ventricles, finally passing out to the surface of the brain between the medulla and cerebellum."

I made a careful examination of the temporal bone. An abscess, apparently of long standing, and of a narrow tortuous course, surrounded the lower and anterior portion of the external auditory process, where the bone was completely denuded, but it remained of its natural colour and consistence. It communicated with the floor of the external meatus, at a point anterior to the insertion of the membrana tympani. The membrana tympani itself, and the ossicles, had been completely removed; the cavity of the tympanum was filled with dark-coloured fetid pus, and its lining membrane thickened, pulpy, and of a reddish drab colour. The mastoid cells presented a precisely similar appearance (see page 362), and in several of them this pulpy state of the membrane completely filled up their cavities, and bulged above the level of the section made through that part. Both apertures into the labyrinth were open, and the structure of the internal ear was disorganized. There was, however, no communication from without into the cavity of the cranium; but the surface of the petrous bone corresponding to the site of the aperture in the dura mater was of a dark and somewhat greenish hue. On making an oblique section through the bone, between this dark mark and the cavity of the tympanum, traversing the posterior margin of the bony meatus, the same dark tinge was apparent, showing the track of the morbid action which passed from without inward; but there was no caries or necrosis observable in any portion of the bone submitted for my inspection.

Circumscribed inflammation and abscess of the brain, causing absorption or caries of the temporal bone, may (it is said) produce otorrhœa, and the pus may be discharged through the ear. Dr. Corrigan related a case, and exhibited specimens, in 1841, that would, at first sight, appear to lend credence to this opinion. A female, aged 29, was received into hospital semi-comatose, retching, with a slow pulse, pain in the head, and a copious fetid discharge of purulent matter from the right ear. Five days after

admission she died; on examination it was found that "the brain appeared dry superiorly, and the veins enormously distended with dark-coloured blood; at the base of the brain, on the right side, was an abscess, in the substance of the brain itself, not encysted, and filled with a green fetid pus. Sero-purulent matter was effused at the base of the brain. The petrous portion of the temporal bone was carious to a considerable extent; the dura mater covering it was discoloured, and there was purulent matter beneath it." "It had been a question," he adds, "whether the disease of the brain or that of the bone was the earlier. In his cases they appeared both to proceed *pari passu*." We are not informed, however, how long the discharge from the ear had existed. I would say it, or rather the disease of which it was a symptom, had existed long before, and had produced the affection of the bone, and subsequently that of the brain. Authors speak also of abscesses and collections of matter within the cranium finding their way through the petrous portion of the temporal bone, into the external auditory tube. This is a doctrine I cannot subscribe to —it is unsupported by facts; it is much more probable, that if the brain was the original seat of disease, that death would have ensued long before this matter could find an outlet through the very hardest bone in the whole body.

It is unnecessary to multiply examples, proving the fatal results of neglected otorrhœa. The nervous symptoms which sometimes attend those cases during life are, as already stated, very anomalous. About three years ago, I attended a case in connexion with Dr. Cuthbert, of which the following are the particulars. Master J., aged 7, of a strumous habit and delicate make, had long suffered from ophthalmic inflammation, and it was observed that whenever the ocular affection improved, he was attacked with pain in his ear, which was generally relieved by a profuse discharge (see page 273). I saw him in the autumn of 1849; he then laboured under fetid otorrhœa; the membrana tympani had been destroyed, and flabby granulations sprouted from the tympanal cavity. Towards the end of December it was observed that the discharge from the ear had considerably diminished. The boy appeared languid, unusually quiet, and also a little lame. He then complained of a pain

in his left ankle, which, upon examination, was observed to be red and swollen, presenting very much the appearance of that form of diffuse inflammation which attacks the joints when the system is affected with any morbid poison. The pain in the ankle became very severe, and the slightest pressure was intolerable. He was then confied to bed, and lay chiefly on his back, moaning incessantly day and night. High fever set in, characterized by exceedingly rapid pulse, total sleeplessness, constant watching, a flushed face, great heat of head, and general excitement. His temper became remarkably irritable; latterly he seldom spoke, and disliked being questioned, but could answer rationally when he liked. He lay on his back, and had many symptoms resembling catalepsy, particularly of the upper extremities, which would remain for hours in the position they were placed by the attendants. He evinced great dislike to have his head moved; there was no tenderness over the mastoid process, or any portion of the scalp. The meatus was still soiled with brownish fetid discharge. The condition of the ankle remained in the same state throughout. He had no convulsions; neither were rigors observed in the progress of the case, which lasted about six weeks. He died comatose. The friends did not permit an examination. The treatment consisted in the use of mercury, both internally and by inunction, and the application of blisters to the shaven scalp.

The foregoing section having extended to its present length, I have been obliged to omit the insertion of cases illustrative of ordinary otorrhœa and polypi, &c., and must, therefore, refer the reader for such to my former Essay upon this subject, and also to papers published in the Medical Times and Gazette during the last two years. I have, in conclusion, but to entreat my professional brethren to examine with greater care diseases of the ear; to be more guarded in the opinions they give with respect to aural discharges; and instead of "leaving them to nature," and promising patients "that they will grow out of them," to endeavour to heal them in their early stage,—as a class of diseases which, independent of their unseemliness and injurious effect upon hearing, may at any time give rise to symptoms which may prove destructive to life.

HEARING TRUMPETS.

Various ingenious contrivances have for a long period of time been invented for the purpose of assisting the partially deaf; but their consideration belongs more to the instrument-maker than the surgeon. They may be divided into those worn on the head; those held in the hand, and applied to the ear occasionally; and chairs fitted with acoustic apparatus for the purpose of collecting and transmitting, in a concentrated form, surrounding conversation to persons seated therein. I have not yet seen any contrivance which enables deaf persons to hear well in a public assembly; but it is possible that such yet may be invented. Generally speaking, partially deaf patients have a great objection to the employment of large or visible mechanical apparatus, and certainly, as long as persons are able to hear what is said to them in a plain distinct voice, not pitched too high, I do not advise the use of an ear-trumpet. The cases which derive most benefit from artificial means are those of pure nervous deafness, or such as have lost the membrana tympani and some of the ossicula in early life. Patients with dense white tympanal membranes (in which case I believe the lining of the tympanic cavity is also affected by the result of chronic inflammation) do not derive as much benefit from mechanical appliances as either of the former.

A flexible tube, provided at one end with an ivory trumpet-mouth, and at the other with a small ferrule, which fits into the meatus, answers well for conversing with a person at a little distance, and may be whispered into; but it requires to have the mouth applied very near the trumpet-shaped extremity, and is, therefore, not so convenient as a metallic trumpet with a large extremity, which collects sound, and gathers the conversation of those in the immediate vicinity. The best of these latter is that in which the extremity of the trumpet is curved downwards, and opens into a bell-shaped conch, and which is generally known by the name of Miss Martineau's trumpet. Mr. Rein, an instrument-maker in the Strand, London, has given much attention to the subject, and made many improvements therein.

APPENDIX.

DEAF-DUMBNESS.

Claims of the Deaf and Dumb: their Condition in ancient times; their Uninstructed State.—History of their Education, and Literature relating to.—Statistics of: European, American, Irish.—Subdivisions of Muteism: Congenital; First Development of Speech.—Acquired; Causes of.—Complications of Muteism: Paralysis; Idiotcy; Deformity; Blindness.—Dumbness.—Plurality of Mutes.—Sexes.—Marriage.—Family Position.—Twins.—Causes of Congenital Muteism.—Consanguinity of Parents.—Hereditary Taint.—Races.—Legal and Religious State of the Deaf and Dumb.—Feigned Muteism.—Cures of Muteism.

AS I do not think a work upon diseases of the organs of hearing would be complete without a chapter upon deaf-dumbness, I have added the following Appendix. My official position as one of the Irish Census Commissioners has not only afforded me peculiar means for investigating this subject, but has also directed my attention to it in an especial manner; and I have reason to believe that the minute inquiry into all the circumstances relating to muteism which has been lately carried on in this portion of the United Kingdom, is not only the most correct which has yet been undertaken in any country, but is such as to throw much light upon the statistics, and the social, moral, and physical condition of that class of our fellow-creatures deprived by congenital malformation, accident, or disease, of the faculty of hearing, and, in consequence thereof, of the powers of speech.*

* These investigations, which are the first of the kind attempted in the British Isles, will appear at length in that portion of the Report of the Irish Census Commissioners on "The Status of Disease," now upon the eve of publication. A request, however, having been made by the Secretaries to the Meeting of the British Association, at Belfast, in September, 1852, to have the result of the inquiry instituted into the number and condition of the deaf and dumb in Ireland laid before the Statistical Section, I gave—with the permission of His Excellency the Earl of Eglinton and Winton, then Lord Lieutenant of Ireland, and with the concurrence of the Chief Commissioner, Mr. Donnelly—an abstract of that portion of the Census. Notices of that communication have appeared in the local newspapers, and a revised *resumé* of it was published in the Journal of the Statistical Society of London, for March, 1853.

In any inquiry into the condition of the deaf and dumb, two great objects present—a physiological and a social. Under the former the deaf mute may be classed among those afflicted with permanent disease, either congenital or acquired, and, as such, demands the careful investigation of the statistician; and all the causes and phenomena of the affection solicit attention equally with those circumstances attendant upon lunacy, idiotcy, blindness, or any of the other persistent maladies which affect certain portions of the community in all countries. Under the latter head the deaf mute claims the special attention of the philanthropist, and the protection of the State, owing to the forlorn condition to which he is reduced by his affliction, the difficulty he experiences in expressing his wants, and his inability either to educate himself, or to receive instruction through the ordinary channels; and also his constant exposure to crime, from the defect of moral training, and the difficulty of impressing upon him a just idea of right and wrong. Degraded by his uncontrolled passions, he is, moreover, frequently the victim of cruelty and injustice; and being incapable, without education, of properly understanding or duly appreciating the truths of religion, he is reduced to a condition but little elevated above that of the brute creation. Alone in the world, his faculties undeveloped, and shut out by his unhappy circumstances from thoroughly communicating his ideas to the rest of mankind, the deaf mute, in an especial manner, claims the sympathies of all.

Viewed in a statistical aspect, the investigation of this species of permanent disease leads us to inquire into its extent and distribution, and, as far as possible, its causes also; the proportion of those affected to the general population, and the relative proportion of the sexes,—their education, and susceptibility to education, both literary and industrial,—the class of the community which the disease chiefly affects,—and the localities where it principally prevails, in order to see whether geological position, soil, aspect, elevation, humidity, dryness, salubrity or insalubrity of climate, density or paucity of population, unhealthy crowded cities, or open fertile plains, acquired diseases, hereditary predisposition, family peculiarity, or the consanguinity of parents,—may in any way conduce to its development and propagation.

Although it appears from sacred history, that deaf mutes existed from the earliest times (Exodus, iv. 11), no effort was made to afford them instruction until a comparatively recent period. In those ages wont to be called enlightened, and among those nations styled civilized, and even refined, as the Egyptians, Hebrews, Greeks, and Ro-

mans, the deaf mute was—and even at the present day, in the Orient, is—regarded as little removed from the brute, and was often employed for the basest and most degrading offices, such as humanity revolts at. It was believed in ancient times, and the idea is still entertained in other countries less favoured than our own, that the deaf and dumb are incapable of improvement or instruction of any kind; and thus their very passions, unrestrained by any influence, human or divine, were frequently made to minister to the cruelty or the sensuality of those around them. The sagest of the philosophers, and the most imaginative of the poets of antiquity, have left on record the opinions entertained in their days respecting the psychology of the deaf and dumb, and from these we learn that they were out of the pale of either sympathy or alleviation—*mutum ac turpe pecus.* By laws made in different countries, and extending so far back as the date of the Roman code, deaf mutes laboured under legal disabilities with respect to property and evidence, which have only been removed since their susceptibility to education has been established. It remained for Christian benevolence to conceive the noble idea, and modern ingenuity and perseverance to carry out the great work, of developing the faculties of the solitary mute, and of giving him a knowledge of good,—of rendering him independent, and eliciting within him feelings and aspirations, that, but for the blessings of enlightenment, would have slept until awakened in another sphere of existence.

For wealth, men have risked their salvation; for fame, men have perilled their existence; for religion or enthusiasm men have died at the stake;—the miser or the murderer saw, however, the golden glare of riches beyond the gulf of crime; the warrior felt already the laurel on his brow, and heard the shout of his welcoming countrymen as he sought the thickest of the fray; and the martyr beheld heaven opening to him in the blue above his head;—but to me it has always appeared that the patient instructor of the deaf and dumb deserved a reward which nothing earthly could bestow. And the energy, perseverance, and philanthropy of those good men who have from time to time undertaken in different countries that herculean task of teaching the eye to hear and the hand to speak, have only been equalled by the eloquence of those who have advocated the claims which the deaf mute has upon all to whom the Creator has afforded the blessings of speech and hearing.

Miraculous interposition was exercised in favour of the deaf and dumb at the opening of the Christian era, when upon the "Ephphatha" uttered by the divine missionary the deaf heard and the dumb spake. It is re-

markable that the forms and complications of muteism observed in the present day are precisely similar to those described as existing in Judea nearly nineteen hundred years ago,—the deaf and dumb; the lunatic deaf and dumb, or those possessed with a spirit; the blind and dumb; and the partially deaf and dumb. Of the latter form an instance is related by St. Mark, of "one who was deaf, and had an impediment in his speech," and of whom it is said that, when the miracle of the Saviour was performed, "his ears were opened, and the string of his tongue was loosed, and he *spake plain*." It remained, however, for the enlightenment and benevolence of modern times to achieve the task of systematically elevating this unhappy class to the level of ordinary humanity, by kindness, judicious training, and ingeniously devised instruction. The Venerable Bede mentions an instance of a deaf mute being taught to repeat and understand certain words and sentences, by John, Bishop of Hagulstad (now Hexham), in Northumberland, so early as the seventh century. That case of "How Bishopp John cured a dumme man by blessing him" was, at the time, believed to have been effected by supernatural agency; but an examination into its history, and the gradual process by which the instruction was conveyed, will convince the reader that it in nowise deserves to be ascribed to miraculous interference.

Since the invention of printing, the history of the instruction of the deaf and dumb has, with the exception of occasional notices in statistical writings, become the history of muteism.

Rodolphus Agricola, born near Cronengen, in 1442, alludes, in his "Inventione Dialecticæ," to a deaf mute who was able to write in the fifteenth century; but the record of that instance is not sufficiently explicit to enable us to draw any deductions therefrom. How long the being deprived of speech—the great characteristic of man—should have remained in silence and ignorance, the fixed condition of the unhappy, isolated mute, but for the fatherly affection of Joachim Pascha, the chaplain of Prince James II., of Brandenburg, it is difficult to say. This good man, about the year 1560, succeeded in instructing his own mute daughter, by means of a series of pictures, mimic signs, and illustrations of a similar character.

Jerome Carden, of Pavia, who died at a great age in 1576, was one of the earliest to believe in the possibility of instructing the deaf and dumb, and also the blind. He was a philosopher of a most extensive grasp of intellect, as well as a writer of great brilliancy and perspicuity, and was the first to promulgate the doctrine, that the deaf mute could be taught to "hear by reading, and speak by writing."

The first systematic attempt to instruct the deaf and dumb was made by Petro de Ponce, a Benedictine monk, at Sagahun, about the middle of the sixteenth century, during that bright period when the literature of Spain was graced by Cervantes, and its conquests extended, and its councils ruled, by men of the highest genius. It is related by Morales, the historian of that celebrated ecclesiastic, that he taught the two mute sons of a Castilian nobleman, and a young Arragonese, to read, and also to write with elegance, not only the language of their own country, but likewise the Latin tongue; and it is, moreover, stated that these persons could understand by sight the motions and expressions of the lips, and that they also spoke as do those who have been taught in a modern deaf and dumb institution. Of late years much additional information respecting the great Spanish teacher has come to light, chiefly through the learning and research of the Abbe Carton, of Bruges, from whose Journal we learn that he left some autobiographical notices, from which it would appear that he educated many more mutes than has heretofore been supposed, and wherein he states: "To some I have taught the Latin, to others the Latin and Greek, and to understand Italian. There was one of them who received the orders of priesthood, and possessed a benefice, and performed the duties of his office in reciting his breviary."

We cannot, however, suppose that the foregoing instances were the only examples of educated mutes prior to the seventeenth century. All intelligent deaf and dumb persons are acquainted with the language of pantomime, and have certain arbitrary signs by which they can express their meaning to those accustomed to them. The adult illiterate mutes among the Irish peasantry—a people remarkable for action and gesticulation—excel in mimic signs. And from the days of Aristotle, who styled the ear "the organ of instruction," to the time of De Ponce, history is not altogether deficient in instances of instructed mutes, if not in letters, at least in art. Pliny tells us of Quintus Pedius, a relative of Cæsar Augustus, who, though mute from birth, attained to great proficiency in painting; and in the middle of the sixteenth century another deaf and dumb artist, Juan Fernandez Navaretti, surnamed El Mudo, on account of his infirmity, flourished in Spain, whose acquirements are thus summed up in his epitaph: "Heaven denied him the gift of speech, that he might give greater life and eloquence to the works of his pencil; and, as he could not speak himself, he made them speak for him."

De Ponce died in 1584; but his system appears to have been fol-

lowed up by his countryman, the monk, John Paul Bonet, who published at Madrid, in 1620, a book, upon the mode of teaching the deaf and dumb, "*Reduccion de las Letteras y Arte para enceñar a hablar los Mudos*," which is, I believe, the earliest work extant upon the subject. How far Bonet was acquainted with the labours of De Ponce, it is, at this distance of time, difficult to decide; but it is remarkable that he does not allude to him. The Spaniards were not, however, unmindful of De Ponce's labours; for in the fourth volume of Friar Beneto Feyjoo's "*Cartas Eruditas y Curiosas*,"* printed in 1733, there is a chapter devoted to the subject, in which the just claims of De Ponce have been defended. From the days of Bonet until the commencement of the present century, the condition of the deaf and dumb does not appear to have attracted attention in Spain. In the year 1800, Dr. Joseph M. Alea, a pupil of the Abbe de l'Epée, opened a private institution for the instruction of mutes at Madrid; in 1805 a national school for the same purpose was established there; a similar institution has since been opened at Barcelona.

I am not acquainted with any Portuguese work upon the subject of the deaf and dumb, and it does not appear that any interest was taken by the inhabitants of that country in the condition of the deaf and dumb, until two Swedish gentlemen, the brothers Borg, founded a school for the education of the deaf and dumb at Belem, near Lisbon, in 1824.

The Spanish system was improved upon in Germany, as we learn from the book of J. R. Camerarius, published at Strasburg in 1624; but, from the writings of Caspar Schott, it would appear that the instruction of the deaf and dumb had been practised by Fabricius, the celebrated anatomist of Aquapendente. About the middle of the eighteenth century private teachers sprang up in different parts of Europe, the most successful of whom was George Raphel, a German, who, in 1718, gave an account of the method by which he had instructed his own three mute children. Professor Jacob Wild, of Lufland, was also very successful in instructing the deaf and dumb. The first public institution for the education of the deaf and dumb was established at Leipzig in 1779, through the instrumentality of Samuel Heinicke, the great upholder of the vocal or articulatory system which is still retained at Vienna and in most of the German schools. The most learned German work on the subject of the deaf and dumb with which I am acquainted, is that of Dr. Schmalz, referred to at page 30.

* I am indebted to Dr. R. R. Madden for this rare work, as well as for information on the present statistics of the deaf and dumb in Spain and Portugal.

The art made some progress in Italy during the middle of the seventeeth century, as we learn from the work of Pierre de Castro, a physician, which gives an account of a son of Prince Thomas, of Savoy, who had been highly educated by E. R. de Carion. Padre Lana-Terzi, of Brescia, devoted his time to the instruction of both the deaf and dumb and the blind; and his work on Natural History, published in 1670, contains some philosophical remarks on the mechanism of speech and the articulating system. In 1784, a philanthropic citizen, Don Pascal de Pietro, founded a day school for deaf mutes at Rome; at the commencement of the present century it had fallen into disuse, but was revived in 1841.

Even as early as 1657, the Dutch writers considered the question of teaching the deaf and dumb, in discussing the subject of a universal language, which then occupied the attention of the learned; and Baron F. Von Helmont, M. D., brother to the celebrated chemist and philosopher of that name, entered into it fully in his work on the Natural Alphabet and the Origin of Letters. Towards the close of the seventeenth century, philanthropists and men of learning in Holland, a country then in close relationship with England, were not behindhand in attempting to educate the deaf and dumb. Amongst the foremost of these was Dr. John Conrad Amman, who instructed a mute girl at Haarlem, and who, at the time he wrote his celebrated work, "Surdus Loquens," in 1690, was in communication with Wallis. He afterwards published an enlarged treatise on the subject, styled, "Dissertatio de Loquenda." The former was translated into English by Foot in 1694.

In France, during the middle and latter part of the eighteenth century, much attention was attracted by the teaching of Father Vanin and Madame de Sainte Rose, and in particular to that of J. R. Pereira, a Portuguese Jew, who is said to have invented a syllabic manual alphabet. Until lately the merits of Pereira—a teacher whom Buffon styled, "*l'homme unique, l'homme necessaire de cet art inconnu*"—do not appear to have been sufficiently known or appreciated. A work, however, has lately been published in his defence by M. E. Seguin, at Paris. About the same time, the benevolent Abbe de l'Epée, who devoted his whole life and fortune to the subject, brought the system of instructing deaf mutes to great perfection in the Royal Parisian Institution, then recently established. He died in 1789, but his efforts were successfully carried out by the Abbe Sicard. The principal French work on this subject is "De l'Education des Sourds Muets de Naissance," by Degérando. Andral wrote the article Surdi-Mutité in the Dictionnaire

de Médecine, with great care, and in a philosophic spirit. Morel's Annals likewise contain much information.*

An educational establishment for the deaf and dumb was opened at Copenhagen in 1807 at the expense of the State, and another in Stockholm in 1808.

The earliest production of an English author in any way relating to the instruction of the deaf and dumb, is the Latin work of Bede, "De Loquela per Gestum Digitorum,—Libellus," which was printed at Ratisbon in 1532. It contains plates illustrative of the manual alphabet, and is, perhaps, the first exposition thereof extant.†

John Bulwer, an English physician, who flourished about the middle of the seventeenth century, is the earliest writer in our language upon the subject of the deaf and dumb. He published two books, the first in 1644: "Chirologia; or, the Naturall Language of the Hand, composed of the Speaking Motions and Discoursing Gestures thereof: whereunto is added, Chironomia; or, the Art of Manuall Rhetoricke: consisting of the Naturall Expressions, digested by Art in the Hand, as the chiefest Instrument of Eloquence, by Historical Manifestos exemplified." In it he gives an account of one Master Babbington, in the county of Essex, "an ingenious gentleman, who, throughe some sicknesse, becoming deaf, doth, notwithstanding, feele words, and, as if he had an eye in his finger, sees signes in the dark; whose wife discourseth very perfectly with him by a strange way of arthrologic, or alphabet contrived on the joynts of his fingers; who, taking him by the hand in the night, can so discourse with him very exactly; for he feeling the joynts which she toucheth for letters, by them collected into words, very readily conceives what she would suggest to him." The second work, published in 1648, was entitled, "Philocophus: or, the Deafe and Dumbe Man's Friend. Exhibiting the Philosophicall verity of that subtile Art, which may inable one with an observant Eie, to Heare what any man speaks by the moving of his lips. Upon the same Ground, with the advantage of an Historicall Exemplification, apparently proving, That a Man borne Deafe and Dumbe, may be taught to Heare the sound of words with his Eie, and thence learn to speak with his tongue. By (I. B.) sirnamed the Chirosopher.—*Sic canimus Surdis.*"

* For an account of all the foreign publications on the subject of the deaf and dumb and the blind, I refer my readers to the *Liste Litteraire Philocophe*, by M. Guyot, of Cronengen; a work of immense research.

† I am indebted to a valuable bibliographical paper, by Samuel Porter, published in the American Annals of the Deaf and Dumb, for a notice of this book.

Sir Kenelm Digby, in his "Treatise on the Nature of Bodies," 1646, gives an account of a Spanish mute nobleman, a pupil of Bonet, of whose ability to speak and read on the lips he was an actual witness. A still more remarkable instance of understanding the motions of the lips is related by Bishop Burnet, in his "Travels through France, Italy, and Germany," in 1685, of a deaf and dumb girl at Geneva, who, he said, "hath a sister with whom she has practised her language more than with any other; and in the night, by laying her hand on her sister's mouth, she can perceive by that what she says, and so can discourse with her in the night." It should, however, be known that the case was not one of congenital, but acquired deafness, and that, as the Bishop says, "this child hath, by observing the motions of the mouths and lips of others, acquired so many words, that, out of these, she hath formed a sort of jargon, in which she can hold conversation whole days with those that can speak her own language."

In 1669, Dr. W. D. Holder wrote "The Elements of Speech; an Essay of Inquiry into the Natural Production of Letters; with an Appendix concerning persons that are Deaf and Dumb." George Dalgarno, a Scotchman, resident at Oxford, wrote, in 1661, "Ars Signorum vulgo Character Universalis, et lingua Philosophia;" and before his death, which occurred in 1687, he published his "Diascolocophus, or the Deaf and Dumb Man's Tutor," a work of great merit, but which, though presented to the public in 1680, does not appear to have attracted so much attention as that of his contemporary Wallis. Neither does it appear that he reduced his system to practice with such effect as the latter. To Dalgarno has usually been ascribed the invention of the first manual, or dactylogic alphabet. These works exercised a considerable influence upon the continent, particularly in Germany.

Dr. John Wallis, Savilian Professor of Mathematics in the University of Oxford, in the latter half of the seventeenth century, is generally awarded the merit of having been the first Englishman who brought to a successful issue the instruction of the deaf and dumb. In 1662 he exhibited to the Royal Society, and also to the King, the first pupil on whom he had experimented, and his essay upon the subject was published in the Philosophical Transactions in 1698. Contemporaneously with Wallis, George Sibscota wrote his treatise called "The Deaf and Dumb Man's Discourse; or, Concerning those who are born Deaf and Dumb."—1670.

Besides the works quoted above, both Wallis and Holdep published papers on the same subject in the Philosophical Transactions. The same

publication likewise contains papers by R. Waller and Mr. Martin upon the subject of the deaf and dumb (see vol. for 1707); the paper of the latter gives an account of a native of Stratharig who was deaf and dumb from birth till his seventeenth year, "at which time he was taken ill of a violent fever; was bled, and the fever abated; after about five or six months, had another attack, was not bled, and the fever ran its natural course; some weeks after his recovery, he felt a motion in his brain which was very uneasy to him, and afterwards he began to hear, and in process of time to understand speech; this naturally disposed him to imitate others and attempt to speak; he was not understood for some weeks, but now he is understood tolerably well."

I have already, at page 345, quoted the history of a similar case related by De Foe of Dickory Cronke, a deaf mute who received his hearing during a severe illness. De Foe likewise wrote the life and adventures of Duncan Campbell, the celebrated deaf and dumb fortune-teller, in 1720. Sir Walter Scott, in his life of De Foe, describes Campbell as "a fellow who pretended to be deaf and dumb, and to tell fortunes," and the same opinion has been lately reiterated in America. I see no reason, however, to discredit the narration of the author, whose ingenious work is well worthy of perusal by those who would be acquainted with the early history of the instruction of the deaf and dumb in England. Campbell was, it appears, educated by an acquaintance of Wallis, whose system was in De Foe's work first made known popularly. Having mentioned, in confirmation of Campbell's proficiency the names of several educated mutes then in England, De Foe writes: "As there are a great many families in England and Ireland that have several, and some even have five or six dumb persons belonging to them, and as a great many more believe it impossible for persons born deaf and dumb to write and read, and have thence taken occasion to say and assert that Mr. Campbell could certainly speak, I could never think it a digression in the history of this man's life to set down the grammar by which he himself was taught, and which he has taught others, two of which scholars of his are boys in this town, partly to confute the slander made against him, and partly for the help of others dumb and deaf, whose parents may by these examples be encouraged to get them taught."

We now approach the most remarkable period in the history of the deaf and dumb in the British Isles. Thomas Braidwood, the father of British instructors of the deaf and dumb, opened a school, on the system of Wallis, in Edinburgh, in 1760. This was the first academy of the kind in Europe, and from it sprung in after times all the other in-

stitutions of a like nature in Great Britain. Braidwood was induced to undertake the education of the son of an eminent merchant at Leith, and was so successful that he afterwards instructed as many as twenty pupils at a time. The number of cases in which public, and subsequently national, institutions have arisen from the interest awakened in some philanthropic mind by a mute child, is truly remarkable. Besides those alluded to in the foregoing, I may mention, in addition to Braidwood, the instance of Gallaudet in America; Townsend in England; and Orpen in Ireland. Braidwood did not disclose his method of teaching, nor leave any literary production behind him, but his academy is spoken of in terms of high commendation by several distinguished writers of that period,—Pennant, in his Tour through Scotland in 1772; Lord Monboddo, in his work on the Origin of Language, 1773; and Dr. Johnson, in his Journey to the Western Islands of Scotland, 1772. When the latter visited the "College of the Deaf and Dumb" at Edinburgh, there were twelve pupils in it; and he says, "it was pleasing to see one of the most desperate of human calamities capable of so much help. Whatever enlarges hope will exalt courage. After seeing the deaf taught arithmetic, who would be afraid to cultivate the Hebrides?" Herries, in his work on the Elements of Speech, in 1773, and Arnot, in his History of Edinburgh, likewise mentioned Braidwood; but the work which gives the fullest account of his mode of instruction is, "Vox Oculis Subjecta: a Dissertation on the most curious and important Art of imparting Speech and the Knowledge of Language to the Naturally Deaf and (consequently) dumb; with a particular Account of the Academy of Messrs. Braidwood, of Edinburgh, and a proposal to perpetuate and extend the benefits thereof;"—published in London, in 1783, by an American gentleman, whose son Braidwood had educated. From it we learn that articulation was one of the chief means employed at the Scottish Academy, and it would appear that great perfection was attained in speaking by the pupils educated there. To assist in imparting a knowledge of vocalization, we are told that the master employed a little instrument composed of "a small round piece of silver of a few inches long, the size of a tobacco pipe, flatted at one end, with a ball as large as a marble at the other," for placing the tongue of the pupil in the right position. In 1783, Braidwood removed his academy to Hackney, near London, where it is said that one of his first pupils was a son of the celebrated Charles James Fox. He died in 1806, but his institution was continued by his widow and grand-children until 1816.

Henry Baker, of London, who died in 1774, and who corrected stam-

mering, and taught several deaf mutes to speak and read on the lips, is also mentioned by Dr. Johnson. The Rev. W. Dutens, in an article in the Christian Observer for July, 1809, "On the Capacity of the Deaf and Dumb," likewise alludes to him as a most successful teacher.

In 1770, a translation of the work of Professor Buchner, of Halle, "An easy and very practicable method to enable Deaf persons to Hear," appeared in London. One of the few novelties in the book is the account of a partially deaf person, who was enabled to hear by having a thin slip of wood touching his own upper teeth and also those of the person speaking. It is needless to say, that this device is quite inapplicable to the congenitally or the totally deaf mute.

Dr. Joseph Watson, a nephew of Braidwood, published, in 1809, a work upon the "Instruction of the Deaf and Dumb; or a Theoretical and Practical Means by which they are taught to speak and understand a language," &c. The first public school for the gratuitous instruction of the deaf and dumb in Great Britain was established at Bermondsey, near London, in 1792, chiefly through the instrumentality of the Rev. John Townsend, who so largely contributed to the formation of the London Missionary and the British and Foreign Bible Societies. From it sprung the London Asylum in Kent-road, opened in 1807, by Mr. Townsend and the Rev. H. C. Mason; Dr. Watson was first master of it. A volume of memoirs of Mr. Townsend has been already published both in England and America.

In 1801, a translation of the Abbe de l'Epée's "Method of Educating the Deaf and Dumb, confirmed by long experience," was published in London, in which the system of that celebrated teacher was fully expounded. A deaf and dumb boy, who was found wandering through the streets of Paris, was adopted and educated by the good Abbe, and named Theodore. "This boy was afterwards discovered to be the son of a nobleman, and the rightful heir of a large fortune, of which he had been deprived by the villany of a near relative." So romantic an incident naturally attracted much attention in Paris, and became the basis of a drama, by M. Bouilly, entitled, "L'Abbé de l'Epée," which was long popular in the French capital, and has been translated into English and several other languages. De l'Epée was the great advocate in his day for methodical signs; and both in his time and since, several attempts have been made to compile a system of such, of which the latest is that recently made in this city by the publication of a prospectus, from a number of benevolent individuals, in which premiums are offered by a mute gentleman for the best essays on a Dictionary of Universal Signs.

The various works upon the structure, physiology, or the diseases of the ear, already referred to in the bibliographical sketch at the commencement of this work, allude either directly or incidentally to the subject of deaf-dumbness; but, upon the whole, practitioners in aural surgery are generally not so well informed upon the subject as instructors of the deaf and dumb.

The different cyclopædias published in Great Britain during the early portion of the present century contain articles upon the ear, deafness, and the deaf and dumb; but, although very correct as regards anatomy and physiology, they are defective in the statistics relating to that class, and also as to the mode of their instruction, &c. The article in Rees' Cyclopædia is especially of this class. Dr. Gordon wrote the article "Dumb and Deaf," in the Edinburgh Encyclopædia, with great care and attention, and Dr. Roget, already so well known to science, supplied that upon the "Deaf and Dumb" to the Encyclopædia Britannica; but by far the best modern article which has appeared in publications of this nature, is that in the Penny Cyclopædia, published in 1837, and which was contributed by Mr. Charles Baker, Head Master of the Yorkshire Institution. To this gentleman science and humanity are likewise indebted for several articles relating to the deaf and dumb, published in the works of the Society for the Diffusion of Useful Knowledge, and also for many valuable educational books.

In 1819, J. P. Arrowsmith published in London "The Art of Instructing the Infant Deaf and Dumb;" the object of which was to show that they could be educated with equal facility at home, or in schools for hearing and speaking children, as in institutions specially intended for the deaf and dumb. Mr. Arrowsmith was not himself a professional instructor of the deaf and dumb, but having a mute brother, his attention was in a special manner directed to the subject. In that work the author criticises the management of the British Institutions, for having devoted too much time and attention to the subject of utterance; and the British teachers, for having made so much mystery of their art, and keeping a knowledge of it concealed unless when paid a large sum of money. In this latter particular the author was fully justified; his work would, however, have attracted but little attention had it not been noticed in the London Quarterly Review for 1822. A similar proposition to Arrowsmith's—of educating deaf mutes along with hearing children—was some time afterwards made in Belfast, and some experiments tried, but the scheme proved unsuccessful.

The claims of the deaf and dumb are now fully acknowledged by

the British public; and although the Legislature has not yet (with the exception of a clause in the Irish Poor-Law Act) made a state provision for that most helpless portion of the community, still their cause was not pleaded in vain; and when their susceptibility for instruction was fairly demonstrated, sympathy and support followed.

We now approach a period when, with the advance of civilization, the public mind, having been awakened to the possibility of educating the deaf and dumb, became impressed with the necessity of affording them special instruction. This persuasion actuating the Governments of most countries upon the Continent, a state relief was provided for the instruction of the indigent deaf and dumb. In the British Isles—the country of voluntary charity—the benevolence of private individuals affected a like object, though not, perhaps, to a similar extent. Besides that in London, institutions for the gratuitous education of the deaf and dumb sprang up in other parts of England, in Ireland, and also in Scotland, of which the first was that established in Edinburgh in 1810; since when, the reports of the different asylums embody the great bulk of the English literature relating to muteism. The Edinburgh Institution was for a number of years ably conducted by Mr. Kinniburgh, who had been a pupil of the Braidwoods. He is the author of several school-books for the deaf and dumb, chiefly of a religious character, among which I may specify, "A Catechism and Dictionary of the First Principles of Religion, designed for the use of the Deaf and Dumb." 1831.* It is much to be admired that most of the works written by teachers of the deaf and dumb are of a serious nature, and it shows the necessity which exists of combining religious with secular instruction.† The Governors of Donaldson's Hospital, one of the noblest institutions in Scotland, have lately opened a portion of it for the instruction and maintenance of the deaf and dumb. There are altogether four institutions of this class in Scotland. A small periodical, styled "A Voice for the Dumb," was published in that country some years ago, but I cannot state with what success.

In 1812 Dr. De Lys excited considerable interest in Birmingham by a series of public lectures upon the instruction of the deaf and dumb, illustrated by an educated mute child; which appeal subsequently led to the establishment of the Institution at Edgbaston, near that town. Its

* The London Catalogue and other English bibliographical lists are very defective in the enumeration of works relating to the deaf and dumb.

† We are sorry to learn that Mr. Kinniburgh has emigrated to Australia.

first teacher was Mr. Thomas Braidwood, one of the family of the celebrated Edinburgh instructor. The Committee of the Edgbaston Institution devoted much attention to reforming the system of instruction, believing that it was at first better to improve the natural language of gesture and expression common to all sane mutes, "before their memories are burdened with the artificial expressions of thought." To this opinion they appear to have been urged by the Rev. W. C. Woodbridge, an American instructor, who happened to be then (1826) in England; and these views were soon reduced to practice by M. Du Puget, a pupil of Pestalozzi's, and previously educated at the Claremont Institution of Dublin. Subsequently, similar institutions sprung up in Manchester, Liverpool, Exeter, Doncaster, and in other parts of England, in all amounting at present to eleven, two of which are private, and the rest are supported by voluntary contributions.

To Dr. C. H. Orpen, at present a missionary in Southern Africa, is due the credit of first drawing public attention to the education of the deaf and dumb in Ireland. He had been attracted by the mode in which Dr. De Lys had succeeded in awakening an interest at Birmingham; and in 1816 he took into his house, and succeeded in instructing, Thomas Collins, a mute orphan boy, from the House of Industry. By a series of public lectures, delivered in Dublin, he enlisted the charitable sympathies of the benevolent, and eventually succeeded in establishing the National Association, together with the Institution at Claremont, which has since that time been the great means of instructing the deaf and dumb in this country. In these endeavours he was ably assisted by Mr. Joseph Humphries, the first Master of the Institution, who had been instructed by Mr. Kinniburgh. A formidable obstacle to the education of the deaf and dumb presented at the commencement of the present century, in the difficulty of procuring teachers, and in the fact that those who were in possession of the requisite knowledge made it an arcana, and demanded a large sum of money, as well as vows of secrecy, from those to whom they imparted it.

Dr. Orpen was for many years the Honorary Secretary to the Deaf and Dumb Association alluded to; and in 1828 he published the first edition of a work, entitled "The Contrast between Atheism, Paganism, and Christianity illustrated; or, the Uneducated Deaf and Dumb as Heathens, compared with those who have been instructed in language and revelation, and taught by the Holy Spirit as Christians." It was dedicated to the Right Hon. Henry Goulburn, at that time Chief Secretary for Ireland, through whose influence the Government afforded

the Institution for the Deaf and Dumb such pecuniary assistance as saved it from ejectment and ruin. The book was printed by Thomas Collins, the deaf and dumb boy, who was Dr. Orpen's first pupil. In 1836 a new edition, under the title of "Anecdotes and Annals of the Deaf and Dumb," was produced at the expense of John Mortlock, Esq., of London. Both editions were largely distributed gratuitously. This book, which is intimately associated with the first instruction of deaf mutes in Ireland, is well known both in Europe and America. Dr. Orpen also wrote "Visits to Claremont; or, Conversations and Correspondence with the Deaf and Dumb."—1829.

Reports of "The National Association for the Education of the Deaf and Dumb Children of the Poor in Ireland, established in Dublin, 18th May, 1816, and now situated at Claremont, near Glasnevin," have appeared annually since that period. The early ones afforded much valuable information upon the instruction of the deaf and dumb; contained several interesting letters and communications from distinguished teachers and educated mutes,and were altogether well calculated to keep alive the interest already awakened by the energy and philanthropy of the Secretary; but of late years not more than three or four pages of these books are devoted to the subject of the Report, and even they contain nothing of value as regards the condition or prospects of the deaf and dumb, while the remaining pages, amounting to more than one hundred, are occupied with lists of the names of subscribers, &c. The Reports of the American Institutions form a striking contrast to these latter.

The next attempt made to provide instruction for the deaf and dumb in Ireland was that by Dr. Kehoe of Cork, who, in 1822, established a day school for mutes in that city; it was, however, closed in April, 1846, from want of support.

In 1826, the family of Archbishop Magee established a day school for the instruction of the deaf and dumb in connexion with the Dorset Institution in Dublin; it is used chiefly as a preparatory school for those waiting to be received into Claremont.

In 1831, some benevolent individuals in Belfast founded "The Ulster Institution for the Education of the Deaf and Dumb, and also of the Blind," of that province; and in 1845, the present noble building was erected by voluntary contributions, amounting to £10,000.

An attempt was made in 1834, by Mr. W. Craig, assisted by the Mercers' Company of London, to establish an institution for the deaf

and dumb at Kilrea, near Coleraine; it did not exist much longer than a twelvemonth.

In 1842, Miss Wright, a benevolent lady, established, and has in great part supported at her own expense, an institution for the education of poor mute children at Moneymore, in the north of Ireland. The pupils are taught wood-carving, crochet-work, and other industrial arts, thereby setting an example worthy of imitation to most other institutions of this class.

In 1846, the clergy of the diocese of Derry and Raphoe subscribed a sum of money, with which and some means previously collected by a lady in the vicinity, the Strabane institution was established both as a day and boarding school.

In the same year, the late William Nugent Skelly, the Very Rev. Dr. Yore, and the Rev. Mr. M'Namara, commenced the "Catholic Institutions" of St. Mary, at Cabra, and St. Joseph, at Prospect, in the vicinity of Dublin. The former was opened for the admission of female pupils in 1847, and the latter for males, in 1849. Preparatory to the reception of pupils into St. Mary's Institution, which is under the direction of the sisters of the religious order of St. Dominick, two of the ladies belonging to that establishment, together with two mute female children, were sent to the Institution for Deaf Mutes of Le Bon Sauveur, at Caen, in Normandy, in order to learn the mode of instruction taught at that celebrated establishment. The single-handed alphabet, similar to that generally used on the Continent and in America, is the one taught in both these institutions. In most of the other schools in Ireland the double-handed alphabet is employed. The Irish schools in general do not attempt to teach the pupils to articulate.

The circumstances appertaining to the six establishments for the instruction of the deaf and dumb, which at present exist in Ireland, will be found in the details of the Census Report, alluded to at page 456. A certain number of the deaf and dumb in the Irish workhouses constitute the only portion of the community of mutes for whose education a state provision has been made. According to the Poor-Law Act, 6 & 7 Vict., cap. 92, s. 14, it is enacted—"That the guardians of any union may send any destitute person, deaf and dumb or blind child, under the age of eighteen, to any institution for the maintenance of the deaf and dumb or blind, which may be approved of by the Commissioners, with the consent of the parents or guardians of such child, and may pay the expense of its maintenance there out of

the rates raised under the authority of the said first-recited Act." As mute children, permitted to grow up in ignorance and poverty, must remain a permanent tax upon their respective unions, and as they cannot be properly instructed except in schools specially constituted for the purpose, it might be found an eventual economy to the unions to have them sent to some of the existing seminaries, that they may receive both a literary and industrial education. The requisites for admission into all our institutions are muteism, the pupil being of a particular age, not being defective in intellect, and, in most instances, having had certain infantile diseases.

A few tracts and minor works calculated to interest young persons in the cause of the deaf and dumb have been lately published in Ireland.

Not many works have appeared in England upon the subject of deaf-dumbness during the present century. By far the best is that by Dr. Scott, principal of the West of England Institution at Exeter: "The Deaf and Dumb; their position in society, and the principles of their education, considered;" London, 1844;—a work which should be in the hands of every parent or guardian of a mute child, as it affords most valuable information with respect to the moral training of the deaf and dumb, as well as that portion of instruction of which they are susceptible prior to the age at which they are admissible into special institutions for their education.

Besides these works already alluded to, several school-books adapted to the deaf and dumb have been published by Messrs. Watson, Vaughan, and others, while Mrs. Sherwood and Mrs. Phelan (Charlotte Elizabeth), the former in the tale of "Theophilus," the latter in that of "The Happy Mute," made powerful appeals to public sympathy on behalf of the afflicted class whose claims they advocated. In a work published in London in 1827, "Sketches of Imposture, Deception, and Credulity," the subject of feigned muteism is exposed with considerable ability. In 1833, Mr. W. C. Fenton published in London "A Brief View of the Institutions for the Deaf and Dumb in Europe and America, with some Remarks on the Yorkshire Institution." The Rev. T. F. Dibdin, in his "Tour in the Northern Counties of England and Scotland," in 1838, gives an interesting account and also several specimens of the etchings of Walter Geikie, a deaf and dumb artist, which affords a fair criterion of what may be achieved in the arts by educated mutes. Of Dr. Kitto's "Lost Senses," and also the works of W. Thornton, Mr. Curtis, and other medical writers, I have already given an account in the Introductory Chapter to this work.

Several of the most devoted teachers of the deaf and dumb in the United Kingdom have long desired to hold a conference for their mutual improvement, and the advancement of that branch of science to which they have specially devoted themselves, but until lately they were not able to accomplish their wishes. The occasion of the Great English Exhibition of 1851 seemed, however, to afford a favourable opportunity for bringing together those gentlemen interested in the undertaking; accordingly, a meeting took place in London in July, 1851, of several of the head masters of the schools of Great Britain and Ireland, and was also attended by some of those of America. The meeting was held in the "Institution for providing Employment and Religious Instruction for the Adult Deaf and Dumb," which was established in 1841, and is intended as well for those who have been educated as those who, having been left uneducated, have attained to such an advanced age as to be inadmissible into any of the existing educational establishments. A second meeting, convened by Mr. Baker, was held at the Yorkshire Institution at Doncaster, in July, 1852.

The result of these most useful re-unions has been the publication of the "Transactions of the First and Second Conferences of Principals of Institutions for the Deaf and Dumb," which was printed by the mutes at the Doncaster School. It is ardently to be desired that these conferences should continue, and that the publication just alluded to should be sustained. It might easily embody abstracts of the Reports of the different institutions in the British isles; notices of whatever useful discoveries are made in the methods of educating the deaf and dumb; and, in fact, be made a magazine, similar to the American Annals, to which I have referred at page 456,—not only useful to all those immediately concerned in the alleviation of muteism, but a most effective means of keeping alive public interest on behalf of the deaf and dumb.

We now turn to America, where the claims of the deaf and dumb have not only met with a hearty response from the public, but where the country at large has made ample provision for their maintenance and instruction. So early as 1793 there appeared in the Transactions of the American Philosophical Society, "Cadmus, or, a Treatise on the Elements of Written Language, and with an Essay on the mode of teaching the Deaf or Surd, and, consequently, Dumb to speak." As I have already mentioned, the number of instances in which national institutions have had their origin in the interest awakened in some philanthropic individual by a mute child, is remarkable. In 1807, the

deaf and dumb daughter of Dr. Cogswell, of Hartfort, U. S., attracted the attention and enlisted the sympathies of the late Rev. Thomas H. Gallaudet,—a man who united the true principles of charity with distinguished scholarship and unwearied assiduity and patience. He subsequently proceeded to Europe, in order to acquire the art of imparting instruction to the deaf and dumb; and having remained for some time a pupil under the Abbé Sicard, he returned to America, accompanied by M. Clerc, who was then (in connexion with Massieu, the favourite pupil of De l'Epée) one of the mute assistants of the Parisian Institution.

The first institution for the instruction of deaf mutes in America was opened at Hartfort in 1817. Since then, no less than twelve other large establishments for a similar purpose have been erected in that country; and the expenses in these are defrayed, like most of those on the Continent of Europe, by a state provision either in grants of land or money.

The subject of muteism generally, as well as the system of instruction in America, has engaged the attention of the learned and benevolent, and the publications relating to muteism which issue from the press in that country are numerous and valuable. The Reports which emanate from the American Institutions, particularly that at New York, are models of their kind. The Rev. W. Gallaudet published some sermons on muteism, a "Child's Picture, Defining, and Reading Book" (Hartford, 1830), and also some reviews and literary articles relating to the deaf and dumb. Several interesting addresses on that subject have been also delivered on special occasions by Laurent Clerc, Dr. Mitchel, Mr. Lewis Weld, and Mr. Harvey Peet. These were subsequently published, and contain most valuable information. Mr. Peet has also written several school-books and elementary works for the deaf and dumb; and to the courtesy of that gentleman I am largely indebted for much information regarding the American institutions, and for an extensive collection of American works relating to muteism. The North American Review for 1834 has a philosophical and admirably written article upon the education of the deaf and dumb, and the Philadelphia edition of the Encyclopædia Americana likewise contains an article on the dumb and deaf. The Christian Spectator for 1837, the New York Literary and Theological Review for 1835, and the Biblical Repository for 1842, also contain articles on the existing state of the art of instructing the deaf and dumb. Tales and poems bearing upon the subject of muteism have likewise appeared from the

pens of Mr. Nack, Mr. Burnet, and Mr. John Edwin Mann,—the latter a deaf mute, educated at the Hartfort Asylum.

In October, 1847, appeared the first number of the American Annals of the Deaf and Dumb, originally conducted by the instructors of the American Asylum, and afterwards ably edited by Mr. Luzerne Rae,—a quarterly periodical which continues to the present time. This is by far the most valuable publication connected with the subject on which it treats at present in existence.

In 1851, the teachers of the deaf and dumb in the United States, and others interested in the education of that class, assembled in convention at the Connecticut Institution, for the purpose of discussing matters of interest connected with the instruction of deaf mutes, at which several papers of interest were read, and subsequently published in the Proceedings of that body.

With a view to the improvement of the system of instruction, the directors of the New York Institution sent the Rev. G. Day, in 1844, to examine the different schools in Central and Western Europe, and Mr. H. Peet, the President of the Institution, was despatched upon a similar mission in 1851. From the valuable Report of the latter, published in the Thirty-third Annual Report on the Instruction of the Deaf and Dumb, presented to the Legislature of the State of New York; together with such revisions and additions as the present census of Great Britain and Ireland has supplied, we learn that there are at present in the world 194 schools, with 449 teachers, and about 7000 pupils receiving instruction. Of these schools, the first establishment of which dates from that in Scotland, erected in 1760, there are in the British Isles, 22; in France, 44; the German States and free cities, 28; Austria, 10; Italy, 11; Prussia, 25; Belgium and Holland, 10; Bavaria, 10; Denmark, Sweden, and Norway, 5; Switzerland, 10; Russia and Poland, 2; the United States of America, 13; Canada, 1; Spain, 2; Portugal, 1; and Asia, 2. Of the entire number, 109 are supported by the governments of their respective countries; 31 by voluntary contributions; 7 are of a mixed character; 23 are private; and in 24 instances the means of support are not stated.

In the seven Irish institutions—all supported by voluntary contributions—there were in March, 1851, as many as 232 pupils,—123 males and 109 females; and from the first opening of the Claremont Asylum in 1816 to the date of the last census, 1081 pupils had received the blessings of instruction in our Irish institutions. With us, the period of instruction has been, on an average, five years, and the "*school age*,"

or that during which pupils are most susceptible of instruction, is from 6 to 15. It is of great importance that this fact should be generally known, as it is now acknowledged by the most experienced teachers of the deaf and dumb that after a certain age the great majority of persons so afflicted are incapable of receiving literary instruction; and this should also stimulate the efforts of those who advocate the claims which that class have upon public benevolence. Some industrial arts are taught in the Irish institutions: it is, however, a question worthy of consideration how far it is advisable to carry on handicrafts beyond a certain extent in connexion with institutions, as opposed to the system of apprenticeships. On this subject, I may refer to the Transactions of the recent Conference alluded to at page 455,—a work which should be in the hands of the managing committees of all our institutions. I may, however, add, that the amount of industrial education afforded in all establishments for the deaf and dumb should be much more extensive than it is at present. As already mentioned at page 452, the Act for the Relief of the Poor in Ireland makes some provision for the education of the deaf and dumb in special establishments for that purpose; and many of the children in the "Catholic Institution" are supported there by that means. I cannot, however, but think that the Board of National Education should provide some separate establishment for the instruction of this class.

The system of instruction for deaf mutes consists—first, of Signing, which may be divided into the employment of such natural, imitative, or descriptive signs or expressions of thought by gesture and pantomime as all mute persons acquire; or those arbitrary and conventional signs used by teachers and others in the habit of communicating with the deaf and dumb. The former are common to all mutes, and vary but little; the latter are generally founded upon some special plan, the method of one teacher differing from that of another,—all of which shows the necessity of adopting some universal system by which the mutes of countries speaking different languages may communicate their ideas. The use of pictures, models, and similar illustrations may be classed under this head. Secondly, Dactology, or finger-writing by either the double or single hand alphabet. The former is that generally taught in this country; the latter, which is chiefly used on the Continent of Europe, and in America, seems to have many advocates at present in Great Britain. Thirdly, Writing and Reading. Fourthly, Lip-reading, by which a mute understands what is said by merely watching the motions of the lips of a speaker: those, however, who

acquire this faculty are generally such as heard and spoke originally, but who, by accident or disease, became totally deaf, and subsequently mute. Fifthly, Articulation, or the pronunciation of words and sentences. To what extent the true congenital deaf person can ever be taught to speak is still undetermined,—only a few of the most intelligent and anxious are at all susceptible of such teaching, and even in these the effort at vocalization is, from want of hearing, harsh and inharmonious, and seldom turned to much account in their intercourse in life. In most of our schools in Great Britain and Ireland, the system has, except in some rare instances, been abandoned, the governors and teachers conceiving that the time spent in acquiring this mechanical form of speech might be more usefully employed in other descriptions of instruction.

Of the industrial education of deaf mutes it is unnecessary to enter at length. I believe there are as many born mutes capable of acquiring a practical knowledge of mechanical and industrial arts as will be found among a similar number of hearing and speaking persons in the same rank in life (see the Tables showing the occupations of deaf mutes in the Irish Census Report for 1851, p. 11).

No approximation to the number of the deaf and dumb in the habitable globe can be made until statisticians have arrived at some definite ideas as to the amount of population on the earth's surface; it has, however, been computed that there are at least eight hundred and fifty thousand deaf mutes in the world, which shows how universal and wide-spread this calamity is. In Europe and America, where, for a number of years past, quinquennial or decennial enumerations of the population have been made, the number of the deaf and dumb has been ascertained with tolerable accuracy. In 1830, Dr. Schmalz, in his work quoted at page 30, published a Table of the number of mutes in the population of the different countries of Europe, from which it appears that they then amounted to 145,131, in a population of two hundred and fourteen millions, or 1 in every 1474; but he does not state the authorities from which his Table was compiled. In the Third Circular of the Royal Institution for Deaf Mutes in Paris, issued a few years subsequently, some Tables were published, in which the number given for all Europe is only 128,966. The most recent European computation is that by Dr. Lachman, who estimates the number of mutes at 211,585, or 1 in 1356, in a gross population of 287,085,876. It is said, that there are but few deaf and dumb persons in China: we know, however, so little of the true state of that

country that assertions with respect to its population must be received as mere conjectures.

Tables, exhibiting the numerical proportion which the deaf and dumb bear to the rest of the population, have been published at different periods during the present century for most of the countries of Europe. Some of these Tables, which show the interest which the governments of several kingdoms have taken in the condition of that class of the community, have been recently collected and published by Dr. Sauveur, by order of the Belgian Government. His investigations were commenced in 1835, and the results, "Statistique des sourds-muets et des Aveugles de la Belgique," were published in 1847, in the "Bulletin de la Commission Centrale de Statistique;" tome iii. Bruxelles: one of those magnificent works brought out under the auspices of the President of the Commission, M. Quetelet.

According to the most recent Tables, we find that in all Europe, so far as authentic information can be obtained, the proportion of deaf mutes to the population is 1 in 1593, a number bearing a great similarity to the Irish returns. The Duchies of Luxembourg and Wurtembourg, and the kingdoms of Tuscany, Bavaria, Belgium, and Holland, have the fewest, the average of these countries being 1 in 2209; while Sardinia, Norway, and parts of Switzerland, exhibit the greatest number of deaf mutes in proportion to their populations, having 1 in every 641·9. In some of the Swiss Cantons the proportion of the deaf and dumb to the population is as high as 1 in 206, and in these localities muteism is generally combined with cretinism, goitrê, or idiotcy. The inhabitants of mountain ranges, or countries much elevated above the sea level, present many more deaf mutes in proportion than low, flat countries; while blindness preponderates in the latter. It would have added to the interest, and increased the value of these observations, could a Table showing the numbers and proportions of the deaf and dumb in each country have been given; but the records of many are defective, and the statistics of other countries are not of sufficiently recent date to afford a fair means of comparison; for example, no authentic account of the number or condition of the deaf and dumb in either Spain or Portugal has appeared in print for some years. But, in Spain, according to information derived from private sources, there are at present said to be 12,000 mutes, or 1 in every 1500 of the population.

Owing to the impossibility of determining the question of congenital deafness at a very early period of life, great difficulties must

always lie in the way of ascertaining the exact amount of the mutes in any country; so that in any Table of ages for this class we do not find a single individual under eighteen months, few under two years. If to the census returns of each country we add three per cent. more congenital deaf and dumb, we shall approach nearer the truth. In this calculation I am aware I differ from some eminent authorities, but, in arriving at this conclusion, other disturbing causes should be taken into account, as, for instance, the number of persons who must be erroneously returned as "deaf and dumb," probably from misconception of the meaning of the query. Among the sources of error may be enumerated those of returning children who had not at the ordinary period begun to speak; cases of defective articulation and aggravated hesitations; and instances of paralysis occurring in adults or persons in advanced life; of none which should properly come under the head of muteism, either congenital or acquired.

The information derived from parents or friends, as to whether the person was born deaf and dumb, must be received with caution; as, in a great number of instances, the query will be answered in the negative,—the relatives and attendants being generally unwilling to admit the fact of congenital defect, and stating that they were sure the child heard well until it was twelve, fifteen, or eighteen months old; although it is not always possible, without special attention being directed to the subject, to form a decided opinion as to the amount of hearing possessed by an infant of such tender age. Upon a strict inquiry, however, it will generally be found that the premises do not warrant the conclusion that complete deafness did not exist at birth, the circumstances related being usually those in which the child noticed general vibration, such as that produced by a piano, &c., and not distinct sounds, like those of the human voice; and the more intelligent the class the more likely are these opinions to prevail. All mutes are not totally devoid of hearing; and, moreover, the visual power in that class being at a very early age called into special action, attention is often mistaken for hearing. There is scarcely a case of muteism in a child under five years of age in the upper classes, on which I am consulted, that the relatives do not come prepared with evidence to prove that the child heard well for more than a year after birth,—in fact, until their attention was specially directed to the state of its hearing. Physiologists have not decided at what age an infant first hears, and in what order its senses are developed or called into action. Taste, with some touch, and a certain amount of muscular motion, are put

forth in the act of sucking, immediately after birth, in all young mammary animals. The earliest directed muscular action of the infant is that of the hand pressed against the nurse's breast, but the period at which this occurs is very variable. Vision seems to be perfect at birth; and even before a child has sucked it is attracted by light, and evidently turns to the blaze of a fire or candle. An intelligent child will recognise its nurse in from six weeks to two months, after which it will begin to smile at those it is accustomed to. During the third month, children appear to be conscious of sounds, and in the fourth exhibit an appreciation of particular sounds, such as chirping, whistling, &c. &c.: after that period they begin to recognise the voice, and from the fourth to the sixth month is, perhaps, the earliest period when an opinion can be formed as regards the hearing of an infant; but the idea of deafness never having presented itself, it is seldom until after the twelfth month (unless there are other mutes in the family) that the friends or attendants begin to perceive that the child does not hear. After the fifth or sixth month, infants recognise particular sounds and distinguish the voices of individuals. This latter faculty is in some degree dependent upon the development of the teeth, which, to a certain extent, influences the sense of hearing, as already stated at page 322. Anatomists say that at, and even for some time after, birth, the tympanum and the meatus are filled with mucus: the former cavity is then so narrow that the quantity of fluid it contains must be very small; and in the latter it is more likely to be some of the liquor amnii which remains in the external auditory canal than mucus. The next development is a combination of tact, touch, and directed muscular motion, as shown first in grasping objects placed within reach of the hand, and then directing them to the mouth, which will occur very early in life. There is no sense so variable in its development as speech. Some children begin to speak at from twelve to eighteen months, others not till after the second year: some pronounce distinctly at two years, and others not until nine or ten: a few not at all. Family peculiarity seems to influence the development of speech, and also congenital malformation of the tongue and mouth. Mothers and nurses have an idea that when a child does not speak at the usual time, it is tongue-tied, and among the lower orders this impression is very popular. True tongue-tie, in which the frænum extends to the lip, or projects over it, is, however, very rare.

Until the inquiry made under the Census Commission of 1851, no means worthy of credit were instituted to ascertain the exact number

of deaf mutes in the British Isles. Computations had been made, and vague conjectures published upon the statistics of deaf-dumbness; but as the mode in which the inquiries were conducted had not been explained, nor the materials at the disposal of the individuals who undertook them communicated to the public, no certainty could be felt as to their accuracy; and moreover, it is manifest that statistical investigations for an entire kingdom can only be effectually undertaken and properly carried out by the State. The Census of Great Britain not being yet published, I am unable to state the precise number of deaf mutes in England, Scotland, and Wales; but taking the population at 20,793,552, according to the abstract of the census of 1853, and estimating the former class at 1 in 1500, in round numbers, I think 14,000 may be set down as the total of the deaf and dumb in that country. How far the elevated districts of Scotland and Wales may alter this calculation remains to be seen.

In Ireland, in a population of 6,553,210, there were in March, 1851, as many as 4151 true deaf and dumb persons, or 1 in every 1579 of the community. In a country like this, completely insulated, limited in extent, and possessing great sameness on its surface, one would not expect that the proportion should alter very much in the different provinces and counties, still we found the following varieties:— in Leinster, 1 in 1794; Connaught, 1 in 1689; Ulster, 1 in 1486; and in Munster, 1 in 1469. Deaf-dumbness, arising from all causes, prevails most in the rural, and least in the civic portions, or those towns whose inhabitants amount to 2000 and upwards. Thus there are, comparatively, fewer cases in proportion to the population to be found in the towns of Drogheda, Carrickfergus, Galway, and Belfast, and the cities of Cork and Dublin, the average of these places being 1 in 2586, than in other localities. Generally speaking, the flat campaign counties, such as Roscommon, Westmeath, Dublin, Meath, and Kildare, present the fewest cases, their average being 1 in 1980; while Mayo, Limerick, Donegal, Waterford, and Wicklow, and also Tipperary, Tyrone, and Fermanagh, the former lying chiefly on the sea-coast, and the majority presenting mountain ranges, have a proportionally greater number of deaf and dumb than the remaining counties, their average being 1 in 1338; and in Wicklow, which is both maritime and mountainous, the proportion is as high as 1 in 1192. Leitrim, Clare, Down, and Antrim, are also high.

In the United States of America, according to the Census of 1850, there were, in a population of 19,381,591 *white* persons, 9422 mutes,

or 1 in every 2057; and among a free *coloured* population of 251,205, there were only 96, or 1 in 2616. In the *slave* population it is said that the proportion of deaf mutes is very much less than either the free coloured or the free white, being as low as 1 in 6552. This latter statement requires confirmation; the census schedules being filled by the owners or overseers of estates, and many of the deaf and dumb being still useful hands, their defect might be overlooked. If, as stated in the American returns, the black population, both slave and free, have fewer deaf and dumb among them than the white, it rather militates against the doctrine of consanguinity of parents leading to muteism in offspring.

This question leads us to the consideration of another, of much ethnological interest, but on which, as yet, sufficient observations have not been made,—that, as to whether race or climate influences the production of congenital muteism. In order to come at some conclusion on the latter subject, we registered (in Ireland) the family names of 1671 persons born deaf and dumb; and of these it was found that 1198 were Irish, 352 English, and 121 Scotch. To arrive, however, at any fair deduction from this registration, we should also possess information as to the proportion of the English, Scotch, and Irish surnames generally throughout the country.

From a communication with which I have been favoured by Mr. Peet, it appears that "there is no impediment in the education of coloured deaf mutes in the Northern States, except the ignorance or indifference of their parents." There were three black deaf mutes in the American institutions last year.

Many questions of interest connected with the deaf and dumb have been propounded at different times, and vague and unsatisfactory conjectures offered for their solution. Several of these I am now able to answer from the results of the very minute inquiry instituted with respect to their condition in Ireland; an inquiry to which the circumstances of this country, the admirable organization of the police force, and the great willingness on the part of the people to afford the necessary information, were particularly favourable. The strict analysis made here of this class of permanent disease has afforded a return far more faithful and minute than any heretofore presented for other countries. I may mention, that, where any difficulty arose with respect to the true physiological or pathological condition of a case, the examination of a medical man was had recourse to; and it is highly creditable to the country practitioners of Ireland, to state that, although

the opinion was requested gratuitously, it was almost invariably given in the cause of science and humanity.

The following list of questions relating to the deaf and dumb, which we employed in Ireland, may assist future investigators in this hitherto insufficiently explored subject, and from it may be seen upon what data the various Tables accompanying the Census memoir were constructed:—

Whether the person was born deaf and dumb, or became so afterwards?

If born deaf and dumb, to what cause such defect is attributed by the friends or relatives; whether to fright, hereditary predisposition, or the near relationship of parents, such as the intermarriage of cousins, &c.?

If the persons became deaf and dumb since birth,—at what age, and to what disease or other cause has such been attributed?

Whether any other members of the family, parent or parents, or grand-parents, uncles, aunts, or cousins, have been deaf and dumb?

What other members of the family, living or dead, such as brothers or sisters, were afflicted with deaf-dumbness, and if so, a statement of the number and particulars?

Whether the person is educated, and if so, where and by what means such education has been acquired?

The mute person's position in the family, whether first, second, or third child, in a family of so many, both living and dead?

Other inquiries, arising, in particular cases, out of the answers to the foregoing, were also made with respect to the nature of the fright experienced either by the mother or the mute offspring; whether the hereditary taint came through the male or female parent; what was the cause of death of any of the mute relatives; whether idiotcy, paralysis, or other diseases or malformation co-existed; and, in case of the marriage of mutes, what had been the result to the children, &c. Registries founded on the foregoing queries should be preserved at all institutions for the deaf and dumb.

True and uncomplicated muteism may be divided into two classes. The first is congenital, or that with which the patient is born,—it is either functional or organic; in the latter case it usually arises from some defect of organization, either in the mechanical apparatus of hearing, the auditory nerve, or in the great nervous centre itself, the causes of which are specified under the head of malformations of the

the internal ear at page 314. The second is that proceeding from disease acquired subsequent to birth, but which occurred so early in life that speech had never been fully attained, or, from the deafness being so intense, that speech was either entirely lost or greatly impaired in after life. In the latter class the acquired disease, particularly if it occurs within the first few years of life, reduces the patient to the position of a mute equally with the former, and so places both in the same division in a social and statistical point of view; but, as there are many topics of scientific interest appertaining specially to each class, they should be kept separate, and the calculations belonging to each given in distinct columns in the several Tables relating thereto.

It must not be supposed that under the foregoing general division of congenital and acquired deafness, we can include or define all the deaf mutes of the community. There are certain complications which have not heretofore been much investigated, but which were so carefully considered in the Irish census of this class, that the results which we obtained are likely to remain—until still more extensive inquiries are instituted—illustrations of the laws or principles which regulate these complications.

The first great division is into the deaf and dumb; and, the dumb but not deaf. Of the total 4814 Irish returns, 329 were erroneous; and it was found, upon instituting a minute inquiry into the circumstances of each of the remaining 4485 mutes, that 334 were dumb, but not deaf. Dumbness may be either congenital or acquired; of the latter I have given an example at page 342. The majority of the "dumb only" proved, upon examination, to be either idiotic, paralytic, or both; they could hear, but did not speak, or, if they made any attempt thereat, it was so inarticulate, either from defect in the organs of speech, or inability of apprehension, that they were incapable of making themselves understood. Their affection, like that of the "deaf and dumb," was chiefly congenital. Heretofore it has been generally believed that defect of speech is solely and invariably the result of impaired or total loss of hearing. Nevertheless, it appears from the faithful report of those medical men who examined and inquired into the cases, as well as from my own personal observation of some of those included in the returns, that instances of simple and uncomplicated idiopathic dumbness, independent of deafness, although rare, really do exist. The details of some of these cases are embodied in our Report, which has not only materially added to the general and vital statistics of this country, but has greatly increased our stock of

knowledge upon the subject of muteism generally, and has thus enlarged the boundaries of science, and conferred a benefit upon humanity. The total number of "dumb only," without being either paralytic or idiotic, was 131 : the dumb with paralysis numbered 45 ; the idiotic dumb amounted to 115, and those afflicted with both paralysis and idiotcy to 43.

Among the cases of persons dumb only, and not otherwise affected, is that of a boy in the city of Dublin, aged 10, whom I have often examined. He is neither deaf, paralytic, idiotic, nor deformed. He is intelligent, and understands what is said to him; but his manner is excited, and he has a peculiar anxious and restless look, and is rather irritable, and very intolerant of restraint. The organs of speech are well formed, as are also those of hearing, so far as can be observed; but he makes no attempt at articulation, or the pronunciation of words. When he wishes to attract attention he utters a loud, sharp, bark-like sound.

An instance similar to the foregoing, in a boy seven years of age, has been thus reported on by Professor Doherty, of Galway : "He is dumb, or very nearly so, but not deaf; on the contrary, he is very quick of hearing, has acute sight, and his understanding is by no means blunt. His head, though small, presents no peculiar deformity; and he protrudes his tongue to the usual extent. He understands what is said to him, will go of a message, and evidently possesses imitative powers. But though far from being an idiot, it is quite evident that his mental powers are not perfect; there is a restlessness depicted in his face, and extreme energy in his movements, and I rather think a mischievousness in his acts. I am, on the whole, inclined to view his case as similar to those described by Woodward in the 'American Journal of Medical Sciences,' and to regard it as a peculiar form of insanity."

Jussieu has given an account of a Portuguese girl, fifteen years of age, who was born without a tongue.—(On this subject see Paris and Fontblanques' Medical Jurisprudence, vol. i. p. 370.)

Dr. Purdon, of Killeshandra, has reported upon some instances, dumb only, in the county Cavan,—one, a female, aged 40, "can hear perfectly well, but has no power over the muscles of her mouth, so that she cannot drink without throwing back her head, neither was she able to suck when an infant. She also suffers from partial paralysis of the tongue itself, which she cannot protrude beyond the lips, nor elevate to the palate, although she is not tongue-tied. In other respects she is well formed, strong, and active. 'No' is the only word she can pro-

nounce." A female, aged 16, "is not deaf, but cannot attempt to pronounce any word. The tongue is well shaped, can be protruded, and bent downwards, but not elevated; she has strabismus of both eyes, but has no defect in the muscles of the mouth. The dumbness appears to be caused by some original malformation of the brain." "A boy, aged 12, can pronounce the words 'da' and 'ma,' but no others. He is good-looking, intelligent, and has a well-developed muscular system; his tongue is well shaped, but adheres too closely to the floor of the mouth; he has no power to protrude it beyond his lips, nor elevate it towards his nose; the muscles of the lips are paralyzed; his hearing is perfect." A male, aged 20, "can hear perfectly well; is not idiotic, but passionate; he can say 'ay' and 'no' very well; his tongue is rather thick, and misshapen at the point, but he can whistle; I found him quick in comprehending, and answering my questions by gesticulation."

Dr. Walsh, of Ballinakill, has afforded the following return upon the case of a man, aged 20: "He is completely dumb, seemingly not capable of giving expression to even inarticulate sounds; his hearing is acute and correct, and he is in no way guided by observing the lips of the speaker; he is an intelligent, well-formed, agricultural labourer; his tongue appears shorter than natural, and he cannot protrude it beyond the lower lip, but can move it from side to side with freedom; he has no cerebral disease."

These cases will serve to explain the meaning attached to the term "dumb, not deaf," or "dumb only."

In many instances of defective articulation, as well as severe stuttering, and of partial muteism—a disease not yet well described by authors—there is a peculiar narrowness and an unnatural height of the palate immediately behind the upper incisor teeth.

Of the 4151 true deaf-dumb afforded by the Irish returns, 159 were also either idiotic or paralytic; 3325 were born deaf, and consequently remained dumb, but had no other mental or bodily defect; 400 became deaf mutes after birth, by accident or disease, or in the proportion of about 1 to 11 of the former. In 126 instances, notwithstanding that great pains were taken to acquire the necessary information, it was not possible to find out whether the disease was congenital or acquired. They might be divided according to the former ratio. The general proportion of those who lose their hearing after birth is said to be about 1 in 10,000. In Ireland, we find that only 1 in 12,181 lose their hearing to such an extent, or so early in life as subsequently to become mute.

Comparing the congenital with the acquired cases, we found some

remarkable differences caused by localities. In the former class, the proportions were 1 in 2115 in the civic, and 1 in every 1760 in the rural; whereas, in the latter, the reverse obtained—the acquired being in the proportion of 1 in 9104 in the civic, and 1 in 13,107 in the rural —congenital deafness existing most amongst the rural population, and that acquired after birth prevailing most in crowded cities and towns, where children and young persons are particularly exposed to accidents, scrofulous affections, and deleterious influences arising from density of population, unwholesome food, impure air, and insufficient sewerage. Moreover, the populations of cities and towns being in great part recruited by immigration from the rural districts, the deaf and dumb are more likely to remain in their native homes than those possessing speech and hearing.

It has been well observed, that man, though by organization and intellect able to exist in all latitudes, is not completely proof against the influence of climate, nor can he escape those maladies which arise from the action of physical causes peculiar to certain localities. In Switzerland, where we find the greatest number of deaf mutes, compared with its population, in any known country, the prevalence of scrofula (a disease which may, I believe, be induced by circumstances independent of hereditary taint), as well as the miserable condition of a large portion of the population, who are located in low, damp valleys; who live in comfortless dwellings, with but little light or heat; who seldom taste animal food, but subsist chiefly on milk and farinaceous materials, and drink water derived from melted snow,—it is not to be wondered that deaf-muteism, as well as goitre and cretinism, are so frequent. Belgium, on the contrary, as has been remarked by Dr. Sauveur, contains the least proportion of deaf mutes, and this he accounts for by its flatness, and the great fertility of its soil; in addition to which, the poorer classes, among whom deaf-muteism is most frequently found, are always able, either by labour or public charity, to provide the necessaries of life, as well as care and medical relief in case of sickness.

With respect to the sexes of the deaf and dumb, some questions of interest have arisen. In accordance with one of those immutable laws which appear to govern mankind in all countries, more males are born than females; but as in the first years of life more boys die than girls, the sexes soon become equalized, and subsequently there is in every population an excess of women over men. Yet the proportion of male deaf mutes from all causes exceeds the female considerably, but it

differs somewhat in the two great classes of congenital and acquired. According to our Irish investigations, the proportions were 100 males to 74.61 females in the former; and 100 males to 91.46 females in the latter. It must, however, be remarked, that, at the time these investigations were conducted, there was rather an undue proportion of females in this country.

Writers have asserted, that the organs of speech in deaf mutes are either malformed, or, owing to want of exercise, remain undeveloped; that the tongue is short, thick, and only suited for chewing and swallowing; that the voice is rough and nasal, the gums very irregular; that the uvula is also deformed, and often turned to one side; that the chest is narrow, and the lungs, from want of sufficient play and the ordinary use as in speaking, are very liable to tubercle, and hence the greater mortality of the deaf and dumb before the end of the second decade of life. Such, however, has not been my observation or experience of this disease, unless when complicated with idiotcy, paralysis, or other mental or bodily defects; cases of that nature being the exceptions to the rule, and complications of true congenital muteism. The voice is inharmonious and defective in modulation, because the persons so affected do not hear; it is indeed very peculiar, so much so, that those in the habit of examining deaf and dumb children will, from the tone of voice, be generally able to pronounce with certainty upon the defect. With respect to the pulmonary affection, it is more likely to have been induced by the presence of scrofula, the most frequent cause of muteism, than by quiescence of the lungs.

The causes of muteism may be divided into the proximate and the remote; the former appertaining to the individual affected—the latter chiefly derived through the parentage. Regarding the former or immediate cause, it is, as already stated at page 464,—original organic defect, usually some malformation of the organ of hearing, owing to arrest of development; or, it may be, acquired disease.

Three special causes seem to influence the production and propagation of muteism: fright experienced by the mother while pregnant; family peculiarity, or hereditary taint; and too close consanguinity, or the intermarriage of near relatives.

The most popular opinion with respect to the cause of deaf-dumbness is that of fright experienced by the pregnant mother; and in this disease the same circumstances are related as those which are adduced to account for hare-lip, club-foot, idiotcy, nævi, decrepitude, or other congenital malformations or arrest of development, consisting generally

of some shock or mental emotion, seeing a disgusting object, meeting a mute person, or being strongly impressed with some superstitious dread. How far women pregnant at the time of the shock or impression are so susceptible of such as to affect the growth or appearance of the fœtus, is by most educated persons considered questionable, and is by many altogether denied. There have been, however, well-authenticated facts, ever since the days when Laban placed the striped rods before the ewes and female cattle, in order that they might produce mottled offspring, down to the present time,—to establish the circumstance of maternal impressions affecting the children. One of the most remarkable of these is an instance related by Malblanche, of a woman, who, having gone during the early months of her pregnancy to see a man broken on the rack, felt a sudden and severe shock; and her child, when born, presented the curious anomaly of dislocation of all the joints of its extremities ; and it was also idiotic.

Among the predisposing causes of muteism, the too close consanguinity of parents may be looked upon as paramount. Many conjectures have been offered upon this subject, but the question has been set at rest by the results of the Irish census. From the delicacy attending this inquiry, the answers must be, to a certain degree, deficient; still, out of the deaf and dumb returns, from all causes, we procured the particulars of 154 instances in which the parents were related in the degrees of first, second, or third cousins. The result of these intermarriages was 100 cases—86 congenital, and 6 acquired—of one mute in a family; 4 of these were dumb only; and 4 were dumb and idiotic. In 34 families, where the parents were related, two children were deaf and dumb, in only one instance of which the disease occurred after birth. There were 14 instances where three mutes were born in families so circumstanced ; and 3 where four in each family were deaf and dumb. The parents were also closely related in instances where six and seven in a family were similarly afflicted.

Deaf muteism frequently exists among several members of the same family, from 2 to as many as even 9. Sometimes all the mutes are males, and all the hearing children females, and sometimes the reverse occurs; in some cases the result of every alternate birth is mute, and in others only every third child. Our Irish returns afford the most accurate information on this and similar subjects connected with the deaf and dumb which have yet been obtained. Of 2962 instances, of uncomplicated congenital muteism, 2512 were cases of single mutes in each family, the sexes being in the proportion of 100 males to 73

females, and of these by far the greater proportion were first children. In each of 287 families there were two mute children, of whom both were males in 97 instances; both females in 48; and a male and female in 142. In 127 families there were three mute children in each; in 18 of these cases they were all males; in 14, all females; in 42, there were 2 males and a female; and in 53, a male and 2 females. Thirty-three instances presented of four mute children born of the same parents, the combination of sexes being 2 males and 2 females in 13 cases; a male and 3 females in 7; 3 males and a female in 6; all males in 5, and all females in 2 cases. Eight families had each five mutes; in 4 of these the sexes were 2 males and 3 females; in 2 all males; in one family 4 males and a female; and in another 3 males and 2 females. In 3 instances there were six mutes in the same family; in 2 of these there were 2 males and 4 females; and in the third the sexes were equal; these occurred in families of 7, 8, and 9 children. One instance occurred in which seven children, all females, were born deaf and dumb, in a family of 13. In one instance of 9 in family, eight were mute,—5 males and 3 females. Families consisting of 5, 6, and 7 children presented the greatest number of mutes. In one instance two mute children, one the tenth, the other the last, occurred in a family of 29, all born of the same parents; the twenty-ninth child, now aged 57, is still living in the county of Cork.

It has been asked whether the ages of the parents in any way influence the production of congenital muteism, but as yet we have no means of determining this question, in a sufficient number of instances, to afford data for a safe answer. I do not think, from what inquiries I have made, that the ages of parents affect the production of deaf-dumbness.

Families consisting of from six to seven children presented single mutes in a greater number of instances than other families. It is remarkable that, while the male sex largely predominated in all other instances, the sexes of mutes were equal in 84 instances in which the eighth child was born deaf and dumb.

Fourteen instances of twins occurred, in which one or both were mute, the sexes of the 28 children being equal. In a family of 13, in the county of Sligo, mute twins occurred twice, being the seventh and eighth births; in the former, both children were mute females; in the latter, a male and female, the boy not mute. Of the entire 13 births in that family, 5 were males, none of whom presented any defect, and 8 females, of whom 7 were deaf and dumb; the order of the

births of the mutes being the third, fourth, fifth, seventh, eighth, ninth, and eleventh. The parents of these children were related. Where both children were of the same sex, in 3 cases but one child was deaf and dumb, and in 2 instances, where the sexes differed, only one child was deaf and dumb. In 6 of the 14 cases, the twins were first births; in 3, third births; in 2, seventh births; in 1, the second; in 1, the fifth; and in 1, the ninth birth, that being the second twin case in the family in Sligo. The parents were cousins in four instances; in 1 case, an uncle and three cousins by the father's side were also mutes ; and in 4 instances, other children of these families were also deaf and dumb. In one of these twin cases, the first and second children of the family were also twins, but not mute.

The transmission of disease by hereditary taint or family peculiarity, whether as a strumous affection or otherwise, is very manifest among the deaf and dumb; but, like most of the circumstances attending the peculiarities of that class, it is obscure and difficult to be accounted for.

Eighty-seven persons, 50 males and 37 females, born deaf and dumb, were married; of these, 45 male and 32 female mutes intermarried with hearing and speaking persons. From the marriage of all these, 182 children had resulted at the time of taking the census, among whom there was but one case of muteism. Five instances were recorded of the intermarriage of deaf and dumb persons; their offspring amounted to 14, of whom only one—a female in the city of Dublin—was deaf and dumb. An instance occurred in the county of Cavan of a deaf mute, son to a man deaf only, but whose uncle and aunt were deaf and dumb. In the foregoing enumeration of offspring are included some instances of children who were under one year of age, and whose hearing and speaking powers were consequently unknown. It is remarkable that while muteism is often manifest in several members of a family derived from a common stock, the defect is seldom transmitted direct from parents to children ; thus, according to the returns of the Hartford Institution, United States, we learn that in 91 instances, where both parents were deaf and dumb, in only 4 cases were the children similarly affected.

There is an instance in the county of Cavan of the transmission of the disease, in direct descent, for three generations,—the grandfather, the father, and four of the present family, being all deaf and dumb. In the county of Limerick was found a mute with five paternal first cousins, and also a maternal second and a third cousin, all deaf and dumb. In the

case of a mute individual in the county of Down, two grand-aunts, two grand-uncles, and two cousins on the mother's side, were also mute. In one, in the county of Leitrim, two grand-uncles, and an uncle and aunt, by the father's side, were mute; and in Belfast was found a mute who had an uncle and aunt on the father's side, and an uncle and aunt on the mother's side, all deaf and dumb. In the county of Kerry two mute children in the same family had a grand-aunt, an aunt, and a cousin by the mother's side, also deaf and dumb; and in the county of Fermanagh, where two mute children occurred in the same family, their three grand-aunts and a grand-uncle by the father's side had been deaf and dumb. Uncles, aunts, and cousins, are the relatives of existing mutes who have most frequently exhibited the same disease.

Among the cases which may fairly be attributed to hereditary taint is that of a man in the county of Down, forty years of age, the son of idiotic parents, who is idiotic, not deaf, but became dumb at six years of age. In one of the families, containing five mutes, there were no other children, and the father was also mute. In the county of Dublin, a female, born deaf and dumb, had a grand-uncle idiotic, and another grand-uncle, by the father's side, deaf and dumb. One sister was also a deaf mute, and two sisters dumb only.

In Kilkenny, in a family of ten, there were four mutes, and one child partially deaf and dumb, being the first, second, third, fourth, and ninth. The history and antecedents of this case are remarkable. The maternal grandmother was insane, and the maternal grand-uncles of weak intellect. After the birth of the second child the mother became insane, and continued so at intervals until the fifth pregnancy, when she was removed to a public asylum. From the birth of the sixth to the pregnancy of the eighth child, she remained with her family, having lucid intervals of different duration. During the eighth pregnancy she was again removed to an asylum. The tenth child was perfect in every respect, but after its birth the mother died, a raging maniac.

In Waterford a man had two deaf and dumb illegitimate children by two different females: all his legitimate family were unaffected.

I have known several cases of acquired deafness in children, some of whose brothers and sisters were born mute, thus showing the tendency to aural or cerebral affections in the family.

The foregoing instances are, however, merely given as examples out of very many of the same class of which I possess the particulars.

There is a very general impression abroad, that hereditary disease

is transmitted with greater intensity through the male than the female line, but this does not hold good, so far, at least, as congenital muteism is concerned. Of 281 instances exhibiting the result of hereditary predisposition, or family peculiarity in the production of congenital muteism, or in which persons born in families, some of the previous members or collateral branches of which were mute, the disease was transmitted by the father's side in 149 cases; whereas in the remaining 132 it came through the female line. In 5 instances the grandfather was deaf and dumb; in 3, the grandmother; in 18, the grand-uncles; in 11, the grand-aunts; in 3, the father; in 1, the mother; in 46, the uncles; in 20, the aunts; and in 176, the cousins, had been deaf and dumb. In some instances we find muteism appear simultaneously in the cousins and other collateral branches of the same family, without any of the previous members being affected, the disease manifesting itself owing to some hitherto unexplained peculiarity. When, however, one of a family is born deaf and dumb, without hereditary predisposition or the consanguinity of parents, not only are those descended therefrom liable to muteism, even with the intermission of a generation, but other members of the same family often exhibit the disease, and hence the natural anxiety evinced by parents upon observing one of their children so afflicted. These facts, though difficult to explain, are some of the most curious and important in the history of deaf muteism.

It has been asserted that deaf muteism is principally an infirmity of the poor, the result of their unhealthy dwellings, bad and insufficient food, impure air, want of clothing, and those other causes which elicit scrofulous manifestations; but if this were the case we should find more mutes in the civic than the rural districts, whereas the contrary obtains. It has also been stated, that mutes are inferior in intellectual endowment, owing to imperfect cerebral development, but, except in those cases complicated with other congenital or acquired defects, it will be found that the deaf mute—when we take into account his deprivation of one of the chief inlets of knowledge—shows as great mental aptitude as other persons of the same class in society. The same arrests of development and malformations of the cerebro-spinal system which, when confined to the organ of hearing, produce deafness, give rise, when they extend to the brain, to idiotcy, epilepsy, and paralysis. Hence the large amount of 362 cases, idiotic or paralytic, or 1 in 12·39 of the entire 4485 returned; while the general proportion of the idiotic to the population of Ireland is 1 in 1460. Many of

the 362 specified above were also defective in stature, or otherwise deformed.

From similar circumstances we find a greater proportion of insane among mutes than among the population at large, in which latter there is but 1 lunatic in 1312, whereas there were, at the time of taking the census, 32 insane deaf and dumb persons, or about 1 in 140 of that class from all causes.

Even among the born deaf mutes hearing is not altogether deficient. Itard makes the following division upon this subject: first, those that can hear the human voice as sounds, but are unable to distinguish words, amounting to about one-tenth of the whole; secondly, those who can distinguish loud noises, such as clapping the hands, the ringing of bells, thunder, cannon firing, &c., who amount to five-tenths; and thirdly, those who are completely deaf, numbering about four-tenths of the whole. The deaf and dumb are, however, particularly sensitive to vibration, and this is often mistaken for hearing. Thus, in the Institution at Paris, the movements of the pupils are regulated by beat of drum; and in the American schools bells are usually employed to call the pupils to school or dinner; it must, however, be remarked, that notice of their ringing is given by those who are only partially deaf, to the rest. I may here mention an interesting physiological circumstance which I witnessed during one of my visits to the Imperial Institution for the deaf and dumb at Vienna, in 1841. The majority of the pupils were always conscious of the vicinity of a military band, though at some distance off; several of them were sensibly affected by different musical instruments when played in the same room with them, though the performers were placed behind a screen; thus they expressed different sensations when wind or stringed instruments were played; and one boy in particular became sick in his stomach upon the trombone being sounded near him.*

Independent, however, of these susceptibilities to vibration, I have met several cases of partial congenital deaf muteism, in which there was much imperfection of hearing, and also a difficulty of speaking plain.

Among the complications of muteism may be mentioned, in addition to those already referred to, bodily deformity and blindness; in the former class may be included cases of curvature of the spine, extreme decrepitude, hare lip, malformations of the head, and partial deficiency of some of the extremities, &c.

* See the Author's "Austria, its Literary, Scientific, and Medical Institutions," &c.

It has been discussed whether blindness or deafness is the greater privation ; and it is asserted that in after-life the loss of sight is a greater privation than that of hearing ; but with this I do not agree, for we know that the memory of objects affords greater consolation to the blind than the memory of sounds does to the totally deaf. In a spiritual point of view, congenital deafness is the greater affliction, for the child so born remains shut up within himself, and, without great educational efforts, his understanding must for ever remain undeveloped, hearing being the chief instrument for psychological advance, while sight is only necessary for physical objects. The blind, however, as has been well remarked by Dr. Frank, meet with more sympathy from society, probably because deafness is not accompanied by any apparent physical defect. But when the person, either from congenital malformation or acquired disease, is deprived both of the senses of hearing and seeing, great, indeed, must be his affliction.

The earliest record of a person deprived of the threefold faculty of hearing, speaking, and seeing, is that afforded by St. Matthew (chapter xii. ver. 22). De l'Epée, and subsequently Sicard, endeavoured to ascertain if an individual so circumstanced could be found, in order that they might test the value of the systems of instruction which they advocated; but no such instance presented during their time. At the commencement of the present century, however, much attention was attracted to an instance of this triple calamity in the person of James Mitchell, a boy from the Highlands of Scotland, who laboured under congenital deafness and blindness, the latter caused by cataract. When about thirteen years of age, he was brought to London, when Mr. Saunders couched the cataract on the left side, from which operation he gained temporary vision ; and Sir Astley Cooper also performed upon him the then fashionable operation of perforation of the membrana tympani. Subsequently Mr. Wardrop succeeded in displacing the opaque lens, and for a time he gained a fair share of vision, but eventually he was barely able to find his way. Dugald Stewart wrote an essay, in connexion with his Philosophy of the Human Mind, upon the case of James Mitchell, in which is embodied Mr. Wardrop's account of the operation, as well as an account of the boy's state when he first visited London. Mr. Wardrop also wrote the "History of James Mitchell, a boy born blind and deaf, with an account of the operation for the recovery of his sight :" 1813. Dr. Gordon, his usual medical attendant, wrote a paper concerning Mitchell in the third volume of the Transactions of the Royal Society of Edinburgh ; and

Dr. Spurzheim has given an interesting account of him in his Phrenology.

The Gentleman's Magazine for the year 1808 records the death, by burning, of Hannah Lamb, a girl nine years of age, who was born deaf, dumb, and blind, but without giving any further history of her case.

The Abbé Carton received into the Institution at Bruges a deaf, dumb, and blind girl, named Anna Temmermans, some years ago, and had commenced her education with great zeal, but as yet we have not learned with what result.

The earliest case recorded in America is that of Julia Brace, who is, I believe, still living in Hartford Asylum. The most recent account of her state is that given by Mr. Woodroff in the American Annals for January, 1849; but little advance had then been made with her education, and, as she was aged 35 years, it is not likely that much will be effected. The Report, however, states that she was intelligent, and could hold communication by natural signs. The case of Laura Bridgman, the pupil of the benevolent and indefatigable Dr. Howe, has enjoyed a world-wide celebrity. This interesting young woman, deaf, dumb, and blind, and also deprived of the sense of smell, and with imperfect taste, was born at Hanover, New Hampshire, in 1829. It does not appear that she was congenitally deaf; and the account states that she had, when an infant, bright blue eyes, and also displayed a considerable degree of intelligence. During her second and third years she suffered from convulsions, and had a violent fever of several weeks' duration, when her eyes and ears inflamed, suppurated, and their contents were discharged; it was also found, upon her recovery, that the other two senses of smell and taste were greatly impaired, and it was only at the age of four years that the child's health was so much restored as to enable her to walk unsupported. Dr. Howe, director of the Perkins Institution for the Blind, at Boston, having heard of her, immediately hastened to Hanover, when he says, "I found her with a well-formed figure, a strongly marked nervous-sanguine temperament, a large and beautifully shaped head, and the whole system in healthy action." She was then little more than seven years of age, and the moral effects of her privation had already begun to appear. She was received into the Boston Asylum in October, 1837. Fortunately for the education and consequent happiness of this child, the raised-letter alphabet had been invented, and with its use and the value of the different characters she after some time became ac-

quainted,—the large, raised letters being attached in labels to the different articles with which she was made familiar. After a while, instead of labels, the individual letters were given to her, and she was taught to place them so as to spell the name of the article presented. "Hitherto," says Dr. Howe, in his first report upon Laura Bridgman, in 1841, "the process had been mechanical, and the success about as great as teaching a very knowing dog a variety of tricks. The poor child had sat in mute amazement, and patiently imitated everything her teacher did; but now the truth began to flash upon her—her intellect began to work—she perceived that here was a way by which she could herself make up a sign of anything that was in her own mind, and show it to another mind, and at once her countenance lighted up with a human expression; it was no longer a dog, or parrot, —it was an immortal spirit, eagerly seizing upon a new link of union with other spirits! I could almost fix upon the moment when this truth dawned upon her mind, and spread its light to her countenance: I saw that the great obstacle was overcome, and that henceforward nothing but patient and persevering, but plain and straightforward, efforts were to be used.

"She was exercised for several weeks in this way, until her vocabulary became extensive; and then the important step was taken of teaching her how to represent the different letters by the position of her fingers, instead of the cumbrous apparatus of the board and types. She accomplished this speedily and easily, for her intellect had begun to work in aid of her teacher, and her progress was rapid.

"This was the period, about three months after she had commenced, that the first report of her case was made, in which it is stated that 'she had just learned the manual alphabet, as used by the deaf mutes; and it is a subject of delight and wonder to see how rapidly, correctly, and eagerly, she goes on with her labours. Her teacher gives her a new object,—for instance, a pencil, first lets her examine it, and get an idea of its use, then teaches her how to spell it by making the signs for the letters with her own fingers; the child grasps her hand, and feels of her fingers, as the different letters are formed; she turns her head a little one side, like a person listening closely—her lips are apart—she seems scarcely to breathe, and her countenance, at first anxious, gradually changes to a smile, as she comprehends the lesson. She then holds up her tiny fingers, and spells the word in the manual alphabet; next, she takes her types, and arranges her letters; and last, to make sure that she is right, she takes the whole of the

types composing the word, and places them upon or in contact with the pencil, or whatever the object may be.' "

With the subsequent progress of this interesting creature,—who is, undoubtedly, the best taught blind mute ever heard of,—the world is already well acquainted. I have introduced the foregoing extracts, in order to point out the steps adopted at the commencement of her instruction, in the hope of directing those who may meet similar instances to make some effort for their alleviation; and for further information I beg to direct the reader's attention to "The Reports of the Perkins Institution and Massachusetts Asylum for the Blind," from 1841 to the present time.

Three other cases have occurred in America, of which notices have been recorded, but none of them have attained the same perfection in acquiring knowledge as Laura Bridgman, who seems to be a person of unusual mental endowments. None of the American cases appear to have been born either deaf or blind, but each had lost the sense of sight and hearing during the first few years of life.

The Reports of the Glasgow Society for the Education of the Deaf and Dumb contain much valuable information. In that for 1839, it is stated that in the mountainous island of Arran, at the mouth of the Clyde, there were no fewer than twelve mutes, in a population of 6427. The same Report likewise contains "Memoirs of persons born deaf, dumb, and blind," embracing, in addition to some of those specified in the foregoing pages, the instances of—David Gilbert Tate; of an English lady, whose case is described by our countryman, Sir Hans Sloane; of Mdlle. Morisseau, a congenital deaf mute, who became blind in the Parisian Institution, at the age of 13; and of Mary M'Leod. Tate was discovered by Dr. Herbert in the island of Fetlar, one of the Shetland group, in 1818: "His parents occupied a miserable hovel, in wretched poverty, and had so neglected this child,—deeming his condition beyond the possibility of melioration,—that he was not even able to walk erect." The account of the English lady, who was at mature age deprived of sight, hearing, and speech, will be found in the Annual Register for 1758. Mary M'Leod "was born blind at Portobello, near Edinburgh, in 1824, and at the age of three years lost her speech. Like Tate, she moved about her apartment on her hands and feet, and her habits became extremely disgusting. When she had taken food, she became furious if not allowed to destroy the vessel which contained it." This girl, like Hannah Lamb, already alluded to at page 477, was burned to death.

No doubt many cases of muteism with blindness must have occurred upon the Continent, and perhaps several at present exist there, but I have not met with notices of them in any French or German work. Mr. I. L. Peet has given an account (in the Proceedings of the Second Convention of American Instructors, already alluded to at p. 456) of a young man, named Edward Meystre, whom he had seen in the Institution for the Blind, at Lausanne, under the care of Mr. Hirzel, its talented Director. Meystre, who, if living, is now aged about 27, lost his hearing from small-pox when eleven months old ; and when eight years of age was completely deprived of sight by the accidental discharge of a gun, loaded with small shot. In a tract on this subject quoted by Mr. Peet, Mr. Hirzel says,—"the character of the deaf mute decidedly predominates in this young man ; we might even say that it masters blindness. All his movements are free and decided, whilst those of the blind are in general embarrassed and uncertain. He retains not the least gleaming of light, and his auditive perception is entirely wanting in the right ear ; with the left he is able vaguely to distinguish a very loud noise, or a very sharp sound. I have, however, made the experiment several times of discharging percussion caps, at two paces distance, but in the open air, without his perceiving it at all. His touch is sure ; but, blunted by an employment which hardens the skin, it has not the delicacy which we observe in most of the blind. His sense of smell, though sufficiently acute, offers nothing worthy of remark."

The account given of the system of instruction pursued in this case is most interesting. After the pupil had made considerable progress in the usual means already detailed in Laura Bridgman's case, an attempt was made to see if it were possible to give him speech to a certain extent: "Placing one of Meystre's hands on my chest," writes Mr. Hirzel, "I blew against the other, and then made him feel my throat while I pronounced the vowel *a*, directing him also to exhale a current of air from his lungs, to cause the larynx to vibrate. In this way I obtained the first vowel. Then a new difficulty presented itself ; the pupil opposed my endeavours, saying that those who could neither see nor hear were incapable of speech, and that these efforts fatigued him. In this emergency I had recourse to his sensual appetite, and the plan succeeded. Knowing his fondness for cigars, I promised them to him at discretion, if he would continue to be docile, and he willingly submitted to exercises which were the more difficult as he could see no utility in them. When, after repeated endeavours, I had succeeded

in bringing his vocal organs to their proper position, he became able to pronounce with sufficient distinctness the vowels *a* and *o*. But in proceeding further, I met with obstacles which at first appeared insurmountable; for during fifteen days every attempt to make him distinguish the sound *ai* from that of *a* or of *o*, &c., failed, and I began to fear that it was only time lost. Inwardly convinced, however, of the existence of a law which, in the apprenticeship of speech, should supply to the touch what the movement of the lips was to the eye, I made a last effort, in the hope of discovering it. At last, when on the point of being discouraged, the recollection of what perseverence could accomplish re-animated me, and I found that which I sought. This law being observed, the deaf mute immediately pronounced four vowels."

This is, I believe, the first instance in which a person deaf, dumb, and blind, has been taught to speak. Of the success which attended the benevolent efforts of the instructor we may judge by the account given by Mr. Peet of his first introduction to Meystre, who was informed by his teacher, by means of the manual alphabet, that Mr. Peet had come from America, and that three of his company were, like Meystre himself, deaf and dumb. "What was our surprise when this blind, deaf mute repeated, in quite a distinct tone of voice, what his teacher had told him, and then with a little apparatus, prepared for the purpose, stamped it on paper! As his teacher communicated it to him, he turned to us with a smile of pleasure, and welcomed us, saying by signs that he understood. At the word America, he pointed to his teacher, and made signs for sailing over the waves. We were also quite gratified in looking over some of his independent compositions. We afterward saw him in the workshop, at his turning lathe, chiselling with remarkable skill and exactness. A number of articles made by him, beautifully executed, were exhibited in a case; they would have been creditable to any workman."

We had in Ireland some years ago a very notable case of a deaf, dumb, and blind girl, whom I have frequently seen and examined; she was a congenital mute, and had lost her sight in infancy, from purulent ophthalmia. She was well formed, and remarkably intelligent; her intelligence, however, was converted into cunning by the training and artifices of an exceedingly clever mother, who made a livelihood by showing her as a monster, and who resisted every means taken by many benevolent persons to provide an asylum and suitable instruction for her child. The girl had rather a placid expression of countenance,

exceedingly delicate hands, and—like all similarly circumstanced persons—an exquisitely delicate sense of touch, so that she could tell any portion of her mother's dress by feeling it, even when held by another. She was fond of sewing, which she could execute with great neatness; but the most remarkable feat which she performed was that of threading her needle, and this she effected in the following manner with her tongue: Having discovered on which side the eye was placed, she then fixed the needle between two of her lower teeth, a little to one side, and, having pointed the thread in the usual manner, she laid it upon the tip of her tongue, with one or two lateral motions of which she managed to pass it through the needle. With such adroitness and rapidity was this effected, that it was scarcely possible to observe the process. She knew the value of different coins, and expressed her gratitude for receiving money by kissing the hand of her benefactor. She could communicate with her mother by a number of natural and arbitrary signs, and was exceedingly apt at receiving any instruction that was afforded her. She occasionally suffered much annoyance from her eyes, as the surfaces both of the globes and the interior of the lids were a mass of fungous granulations. For several years this poor child was exposed by her heartless parent, during the most inclement weather, by the wayside, in some of the outskirts of Dublin; there she might be seen sitting for hours, with a placard attached to her breast setting forth her infirmities, and receiving the occasional alms of the passer-by,—while the mother generally lingered at some distance, watching the result, but never approaching her when any person was in sight. When last I saw her, she and her mother were inmates of the South Dublin Union Workhouse, where the poor girl died in 1847. This is the case alluded to by Dr. Howe, in the Appendix to the Ninth Report of the Massachusetts Asylum, in 1841. At that time arrangements were being made at Belfast to have her instructed, but before they were completed, the mother absconded with the little girl.

During our investigations under the last Census Commission, we discovered six deaf, dumb, and blind persons in Ireland, and four of these were likewise paralytic, idiotic, or deformed. Among the latter, a female, then aged four years, was deaf and dumb, unable to walk, idiotic, had hare lip and cleft palate, and was also blind of both eyes, one from amaurosis, the other from cataract. Another of the idiotic deaf and dumb had congenital cataract.

The two cases of most interest are those of Daniel Cole, in the city

of Dublin, and Hugh Gorman, in the county of Tyrone. The former is a boy aged ten, the seventh of eight children, and who was born deaf, dumb, and blind. The mother attributes the defect in her child to a fright she received during pregnancy. This boy, whom I have had many opportunities of examining, is delicately formed, rather small for his age, and had an attack of hydrocephalus in infancy. The head is natural, but the face and general appearance convey at first sight an appearance of idiotcy—the eyes being very large, egg-shaped, turned permanently downwards, and completely covered by the thinned eyelids. On the right side the cornea is natural, and the humours transparent, but the organ is totally insensible to light. The left eye suffered from inflammation some years ago, and the cornea is now quite opaque. He got his infantile teeth at the usual period, but the mother says they rotted away shortly after the attack of water on the brain. The mouth is now totally devoid of teeth, and the tongue is nearly double the natural size, hangs out of the mouth for about half its length, is very deeply fissured over its entire surface, and presents a dry, toasted appearance, like that of a patient labouring under typhus fever; it is incapable of being retracted, and the mother says it has remained in this state since birth. He seems of a gentle disposition, is by no means devoid of intellect, and is in all other respects healthy. He has already acquired certain signs by which to express his peculiar wants; and his mother, who is a person of intelligence, and exhibits much affection for her child, has taught him several letters of the manual alphabet by making him feel her fingers. He can thus figure the letters upon his fingers, forming "bread," and several other words. His sense of touch seems particularly acute, and he feels with great care every substance with which he comes in contact, and especially the dresses of the persons around him. He is conscious of the fire, and in moving about the room carefully avoids it, keeping at a particular distance, and walking up and down before it when he wishes to warm himself. It is much to be regretted that this poor child's education has not received the attention which it deserves.

The case in the county of Tyrone is a male, now aged six, the first of two children, and was born deaf, dumb, and blind. The cause assigned is premature birth; none of the previous family were affected. The following report of this child was received from Dr. Twigg:—"He is well formed, healthy, handsome, and, considering his peculiar circumstances, intelligent. The only thing against his appearance is a strabismus of both eyes. He is quite blind, but has not cataract, and

the pupils are perfectly sensible to light. He smells his food before he eats it, and also everything he touches that he is not previously acquainted with. His sense of touch appears particularly acute; he rubs every thing he touches between the palms of his hands. There were some clothes drying in the house when I visited him; when he came in contact with these he smelt them, and then rubbed them gently between his hands. His mother placed him near the fire, and he cautiously passed from one side to the other, keeping at an equal distance all the way. He likes to have a switch in his hand, with which he beats gently upon his head. His mother says, that when irritated, he beats his head with the stick, or any instrument he can find. He makes his wants known by crying." This seems an instance of uncomplicated blindness and muteism, which may hereafter be susceptible of education. It is curious that the same peculiarity of beating upon the head with some solid substance existed in James Mitchell's case, related at page 475.

There are in most countries more persons totally deprived of sight than of hearing. The average blind is about one in a thousand, but this varies in different localities, and apparently owing to certain physical causes, usually the reverse of those which induce muteism. Thus in elevated regions, as in Switzerland and Sardinia, where deaf-dumbness is so prevalent that the proportion of mutes to the population is about 1 in 500, there is only 1 blind person in every 1500 inhabitants. The casualties affecting the organs of sight are many more than those affecting the organs of hearing. As yet the records of instances of this triple calamity are not sufficiently numerous nor exact to enable statisticians to say in what proportion it occurs. Congenital cataract is not quite so rare a disease as most persons suppose. It is decidedly hereditary, and frequently occurs in several members of the same family. If it happens as frequently as once in 10,000, it is the most. Congenital amaurosis is a still less frequent affection; and atrophy, or enlargement of the globe, are still rarer forms of born disease.* Moreover, in congenital cataract, unless when complicated with amaurosis or hydrocephalus, there is in the majority of instances only impaired vision, not total loss of sight, so that, upon the whole, persons born totally blind are comparatively very scarce. The combination of both congenital deafness and blindness must consequently be an exceedingly rare affec-

* Upon this subject see the author's essay on Congenital Malformations and Diseases of the Organs of Sight, in the Dublin Medical Journal.

tion, occurring, perhaps, about once in a million. An analysis of the history and pathology of the various cases which have been published confirm these remarks,—one or other of the defects, and sometimes both, being the result of disease or accident acquired after birth.

Having thus far considered the subject of congenital deaf-dumbness, and in the preceding remarks shown what circumstances seem to conduce to its propagation and maintenance, as well as the laws by which it would appear to be regulated, we now come to inquire into the causes of muteism acquired after birth.

The reports of some of the institutions for the deaf and dumb contain Tables showing the causes of acquired deafness. Until lately, the most extensive Table of this kind was that published in the Eighteenth Annual Report of the New York Institution, for 1837, compounded of the statistics of several of the European institutions, as well as those of America, and enumerating in all 787 instances. The Prussian investigations have, like most other inquiries in that admirably managed country, taken into account this and every other subject connected with deaf-muteism, and the results which have been published from time to time are most valuable. One of the most voluminous Tables, showing the causes of acquired deaf-dumbness, is that in the work issued by the Belgian Government, alluded to at page 459. We find there the causes of acquired deafness in 402 cases in Belgium; 80 in Modena; 201 in Holland; 422 from the Hartford Institution, U. S., and 787 from different other countries; in all amounting to 1892. But in some of the columns of that Table the sexes are not given, and as yet I have not met with any Table showing the ages at which the particular diseases which induced deafness occurred. M. Pendola, who published, in 1843, a Table exhibiting the amount and causes of deaf-muteism in 697 cases in the Duchy of Tuscany, made the following division:—Congenital or of unknown origin, 432; affections of the gastro-intestinal system, 69; of the cerebro-spinal, 91; of the glandular and lymphatic, 81; from traumatic causes, 22; and from anomalies in the organs of hearing, 2.

The Table upon the following page, extracted from the report which I laid before the statistical section of the British Association in 1852, and compiled from the Irish Census of 1851, combines both the causes of deafness, the sexes affected, and the ages at which the different diseases or accidents occurred which induced muteism. This is, I believe, the only Table of the kind which has yet been published. I have, in it, for the sake of classification, divided the diseases or accidents which

Causes.	Ages at which Disease or Accident occurred.																						Total.		
	Under 3 yrs.		3.		4.		5.		6.		7.		8.		9.		10.		10 to 15.		above 15.				
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Males.	Females.	Total.
Affections acting locally on the Organs of Hearing.																									
Scarlatina,	1	3	3	4	5	2	1	2	3	1	2	3	.	.	1	1	.	.	1	.	1	1	.	.	.	.	18	17	35
Small-pox,	1	2	.	.	1	.	.	3	.	.	.	.	1	.	.	.	.	.	1	1	.	.	1	1	.	.	2	10	12
Disease of Ears,	1	1	2	.	.	2	.	.	1	.	.	1	.	.	1	1	.	.	.	.	.	.	.	.	.	.	8	2	10
Measles,	1	2	.	.	3	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	6	7
Disease of Throat,	.	.	.	.	1	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	4
Influenza,	.	1	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	3
Disease of Mouth,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	1	2	3
Injury of Ears,	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2
Total,	4	9	5	10	7	7	4	3	4	4	4	4	.	.	2	2	.	.	2	1	1	2	.	.	1		33	43	76
Diseases and Accidents affecting the Brain and Nervous System.																									
Fevers,	3	5	8	7	4	6	4	3	4	5	5	2	1	1	.	.	.	.	1	.	.	2	3	1	1		33	33	66
Paralysis,	10	6	7	7	3	4	.	3	2	3	.	.	3	1	2	2	1	1	1	1	3	3	.	.			30	33	63
Fright,	3	5	4	4	5	2	1	2	.	.	.	1	1	1	3	1	.	.	.	.	.	.	.	.	.		16	17	33
Convulsions,	9	8	2	1	1	1	.	3	1	.	.	.	.	2	.	.	1	.	.	.	2	.	.	.	.		16	15	31
Teething,	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	1	1
Water on the Brain,	.	.	1	2	.	.	2	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.		6	2	8
Epilepsy,	.	.	2	1	1	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		3	4	7
Sudden Immersion in Water,	2	.	.	1	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	2	.	.		4	3	7
Effects of Burns,	2	.	.	1	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1		3	3	6
Hooping Cough,	1	1	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		3	2	5
Disease of the Brain,	1	1	1	1	2	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.		5	2	7
Paralysis of Tongue,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1		.	1	1
"Suddenly struck,"	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.		1	1	2
Attributed to superstitious causes,	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		2	.	2
Injuries of Head,	4	3	3	4	.	.	2	.	1	.	.	.	1	.	.	.	.	.	1	3	2	.	.	.			14	10	24
Total,	35	33	32	27	19	15	9	10	9	9	7	6	7	6	4	1	2	4	6	11	4	3					135	127	263
Unclassified.																									
Effects of Cold and Exposure,	7	2	4	.	2	1	.	2	2	1	1	1	.	.	.	.	1	1	.	2	4	1	.	.			20	12	32
Dysentery,	.	.	2	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.			3	.	3
Scrofula,	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			.	1	1
Childbirth,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1			.	1	1
Injuries unspecified,	3	2	3	1	.	4	2	.	.	.	.	.	1	1	.	.	.	.	1	.	.	.	.	.			10	8	18
Cause unspecified,	16	8	11	13	10	10	6	1	2	5	4	2	3	2	2	1	2	2	3	4	2	.	.				61	48	109
General Total,	65	55	58	51	39	37	21	17	15	19	17	15	11	9	8	3	8	7	12	21	7	5					263	240	503

produced deafness, and subsequent loss of speech, into three sections. The first includes those diseases which, although chiefly of an epidemic character, generally disorganize the mechanical portion of the apparatus of hearing, by inducing local affections, consequent on the original malady. Of these, small-pox, measles, scarlatina, and influenza, produced complete deafness in fifty-seven instances, by exciting local inflammation, ending in suppuration in the middle and internal ear. Scarlatina is, as I have so frequently remarked in the previous portions of this work, one of the most common causes of suppuration of the cavity of the tympanum, ending in destruction of the membrana tympani, and the evacuation of the ossicula. According to the Irish returns, 35 persons became deaf and dumb from this cause. In the American Table, scarlet fever produced deaf-dumbness 44 times in 787 cases; but several of the 63 specified causes in that Table will not bear a medical scrutiny, and many of them were, no doubt, taken upon the hearsay evidence of friends. In the Table compiled by Dr. Sauveur for the Belgian statistics, scarlatina was a cause of muteism in 216 cases out of 1892. Perforation, or even total removal of the membrana tympani, and the malleus and incus, will not of necessity produce total deafness, but the stapes cannot be lost, or the fenestra rotunda ulcerated or otherwise seriously injured, without the cavity of the internal ear being exposed, the perilymph consequently lost, and by extension of inflammation the membranous labyrinth and auditory nerve more or less affected. Neither medicine nor mechanical art can avail in restoring an ear so affected, or in any way improving the hearing of a person so circumstanced; although great improvement may be obtained by the introduction of an artificial membrana tympani, in cases where the natural membrana has been removed, but in which the labyrinth is unaffected. It is scarcely necessary to remark, that unless the patient can hear loud noises in his vicinity, all efforts at treatment will be unavailing.*

The remaining items in this class might all come under the same general head; they include inflammations or injuries of the parts appertaining immediately to the organs of hearing. Ten of these were

* While this sheet was preparing for press, I received Mr. Toynbee's tract "On the Use of an Artificial Membrana Tympani in Cases of Deafness dependent upon Perforation or Destruction of the Natural Organ," in which he has given a description and figures of the little instrument to which I have alluded at page 310. This artificial membrana tympani, manufactured by Messrs. Weiss, consists of a thin layer of gutta percha or vulcanzied India rubber, held between two very small discs of silver,

special diseases of the ears, generally attended by otorrhœa, among which I have classed three cases attributed to disease of the eyes. These were instances of young persons of whom it was related that they first became blind, and, having remained so for a considerable time, then recovered sight, and immediately afterwards became deaf and dumb, —I presume either by metastasis of the inflammation from the eyes to the ears, or owing to the same scrofulous tendency, which induced the ocular affection, having set up morbid action in the tympanum or its membranes. In all the Tables of any note which have as yet been published, showing the causes of acquired deaf-dumbness, an item for ophthalmia will be found, but it is evident that no ocular disease could induce that affection. I have given an account of this disease, with illustrative cases, under the head of "Otitis in connexion with Ophthalmia," at page 273.

The entire number in this first section amounts to 76, the females predominating over the males by one-fourth, probably from the circumstance of the former being more weakly, and consequently more liable to the deleterious effects of the diseases specified.

In the second section are included those diseases and accidents which acted directly or indirectly through the nervous system. The most numerous are paralysis and fever, the former including those complications of muteism already referred to at pages 277 and 341. Fevers of different kinds, typhus, gastric, worm, &c., and endemic to different countries,—are, in all the Tables which I have examined, one of the most

"about three-quarters of a line in diameter," to the outer surface of one of which a fine silver-wire stem, an inch and a quarter long, is attached. Another "kind of artificial membrane is made by fixing the layer of gutta percha or vulcanized India rubber between two very delicate silver rings, from the eighth to the sixth of an inch in diameter; these rings are rivetted together, leaving a portion of the membrane drawn moderately tense in their centre; a margin of the membrane is also left beyond the circumference of the rings, so as to prevent the latter being in contact with and irritating the tube of the ear. To the surface of one of these rings the silver wire is fixed by two branches, and they should be joined so that the outer surface of the rings should look obliquely outwards and forwards instead of directly outwards, thus imitating the direction of the natural membrana tympani. This kind of membrane is often preferable to that previously described, if the meatus is sufficiently large to admit of its passage." The surgeon can cut the gutta percha or India rubber to the requisite size, and, having moistened it with water, then pass it down so as to rest against any remains of the natural membrane which may exist. Mr. Toynbee has afforded several cases showing its applicability. It is certainly a much cleaner procedure than the wool or cotton previously in use; but how far it may be equally applicable in the hands of the patient, or among the lower orders, remains yet to be determined; it is however, a most ingenious contrivance.

prevalent causes of deafness amounting to total loss of hearing. 66 cases are attributed to this cause in the Irish returns, and in a country where typhus prevails so extensively, it is a matter of surprise that so few cases have resulted therefrom. Perhaps the circumstance that infants or very young children do not contract that disease so readily as adolescents or grown-up persons, and that consequently those attacked having been at the time of adult age, they never completely lost the power of speech, although many are partially deaf from this cause,—may account for this peculiarity. Of the pathology of this disease, as well as of acquired dumbness from fever, I have already written at page 342. We require, however, more extensive post-mortem examinations than have been as yet recorded, to determine whether the deafness resulting from this cause is owing to local inflammation, some cerebral lesion, or the general shock given to the nervous system. Hydrocephalus, epilepsy, and convulsions, organic disease of the brain, and cerebral affections unspecified, taken together, produced deaf-muteism in 58 cases. In 33 instances, fright, or some sudden shock to the nervous system, has been recorded as the cause of deaf-dumbness. With these may be included cases returned as "suddenly struck," or superstitiously attributed to some supernatural cause, in which the account given by the friends generally is, that the child awoke with a fit of screeching, and never spoke afterwards. I have met some cases of total deafness in adults and young persons where this had occurred, and in whom nothing abnormal could be discovered in the organs of hearing, neither was there any apparent disease of the brain to account for the complete loss of hearing. Other cases were the result of fright, caused by ignorant or ill-disposed persons. Partial drowning, or sudden immersion in water, should, I think, be classed under the head of nervous shock. We had 7 cases of deaf-muteism resulting from it in our Irish returns; and in the American Table, 3 cases are attributed to "falling in the water." The effect of severe or extensive burns may likewise be classed under this head. Injuries of the head produced deaf-dumbness in 24 cases, of which 16 were by falls from a height. In what way hooping-cough produces deafness, whether by local injury to the ear, such as often occurs during a violent paroxysm of that disease, or from its effect on the nervous system, I am unable to determine. Every nurse is aware of the many anomalous consequences which follow pertussis, and popularly denominated the "dregs of the hooping-cough." This disease has been specified as a cause of acquired deaf-muteism in all the Tables which I have examined. The

entire number in this second section is 263; the males exceeding the females by 8 cases.

The third section includes those cases which could not properly be placed among either of the foregoing classes: the cases attributed to specified causes therein number 37, the males, as in the previous section, predominating over the females. "Cold and exposure," the chief item in this section, has arisen from persons "being caught in a snow-storm," or remaining unsheltered during a severe night. Extreme cold amounts to a large figure in the published Tables of this description, especially in those for very cold countries. Nine out of the 32 cases were attributed to "sleeping in the open air," a circumstance believed by our peasantry to be highly conducive to several maladies, particularly of the nervous system. In 18 instances, the assigned cause was "injury," including a variety of unspecified accidents; and in 109 of the whole, while it was stated that the deafness was acquired after birth, and the exact period specified, the precise accident or disease which produced it could not be ascertained.

An examination of the ages in the foregoing Table shows that the chances of acquiring muteism lessen as life advances. It is stated in books, that deaf-dumbness is frequently induced by diseases affecting infants under one year old. When disease of the ear is manifest in such cases, this may be so; but I cannot subscribe to the doctrine in any other case, unless it can be satisfactorily proved that the infant heard previously. Of the total 503 cases,—in 120, the disease which produced the deafness occurred between birth and the completion of the third year, chiefly, in fact, during the second year; in 109, between the third and fourth years; in 76, during the fourth; 38, in the fifth; 36, in the sixth; 32, in the seventh; 21, in the eighth; 11, in the ninth; 15, in the tenth; 33, during the five following years; and 12, after the age of fifteen.

Is deaf-dumbness curable? To this serious question I must reply in the negative. Except by miraculous interference, I do not believe the true congenital deaf-mute was ever made to hear; and those who lose their hearing so early in life as never to have acquired the faculty of speech come into the same category. If the persons have ever spoken, every possible pains should be taken to keep up their articulation, even although they may not be able to hear themselves speak; for the most marked difference may be observed between the articulation of those mute from birth and such as have ever spoken. Many instances of so-called cures of deaf-dumb persons will be found in the records of literature, both

professional and general, and they have been collected by several modern writers, so that they are accessible to all. They may be divided into the following:—The education of the ear, by the ringing of bells, and other similar means for producing the most penetrating sounds, so as to stimulate the sense of hearing! This was one of the experiments of Itard. Surgical manipulation has been had recourse to for the cure of this malady: the membrana tympani has been perforated, and instruments passed through the Eustachian tubes, in order to relieve the deaf and dumb, and both Itard and Deleau endeavoured to give hearing by forcibly injecting the tympanic cavity with a jet of air. Galvanism and electricity have had their advocates. Moxa, the actual cautery, setons, and other means of counter-irritation, have also been highly extolled. Of late years, mesmerism has been employed as a remedy for this affection; and not long since a deaf and dumb child was brought to my house by its mother, in order that I might inform her how long she should continue to administer to him the globules which a homœopathic physician, who has since left this city, had given her, with the full assurance that they would in time effect the much wished-for object. Curtis states, in one of his clinical reports, that he cured three deaf-dumb persons; but he does not afford their names or residences, nor does he make known the means which he employed. The Messrs. Chambers assert, that Dr. Turnbull cured the deaf-dumb by means of an alkali dropped into the external meatus. The attempts, related in their periodical, were, however, fully exposed by Mr. Kinniburgh, as already alluded to at page 45; and Mr. Baker, whose labours are specified at page 446, also drew public attention to the attempted cures of deafness, in one of the numbers of the Glasgow Herald for 1831. In that publication, in the appendix to Mr. Scott's work on the deaf and dumb, in that admirable repertorium of science, Silliman's Journal for 1836, in the third volume of the American Annals, and in the works of Schmalz, Kramer, Pfingsten, and Williams, will be found most of the so-called cures of deaf-dumbness. Let any one carefully examine the details of the cases, garbled as they are, and then say whether he really believes the statements put forth. Let us take up one of these reputed cures, and analyze the process by which hearing was supplied to a person in whom that sense was wanting, from, in all probability, imperfect development of the internal ear, or disorganization of the apparatus of hearing,—as, for instance, the vaunted cures of Felix Merle, whose secret remedy Itard endeavoured to purchase: it was found to consist of assarabica, rose-leaves, horse-radish, parsley pert,

white wine, and sea-salt!! In conclusion, I must say I do not think it honest in any legalized practitioner to attempt the cure of complete deaf-dumbness, notwithstanding the advice of Mr. Williams, that "a cure ought *always* to be attempted." Two or three instances have, however, been recorded, in which persons previously mute became spontaneously gifted with hearing, and who subsequently spoke. One of these is that related in the Memoirs of the French Academy of Science in 1703, in which a man previously dumb began to speak at the age of 24; and another, related by M. Le Bousoyer Desmortier, in which a young man, twenty-eight years of age, who was previously dumb, acquired hearing and speech. A third instance of a similar effect is recorded in the twenty-fifth volume of the Philosophical Transactions. The history of Dickory Cronke, related by De Foe, to which I have already alluded, is of this class.

I have, as already stated at page 166, seen disease of the ear among the lower animals. Sporting dogs sometimes become quite useless from the amount of deafness under which they labour. Hoffman mentions an instance of a dog blind and deaf on the right side, in which the corresponding optic and acoustic nerves were atrophied and of a yellow colour. How far congenital muteism may extend throughout the animal creation has not yet been determined. An instance is related by the Rev. Mr. Bree of a white Persian cat, with blue eyes, which was completely deaf:—"She produced at various times many litters of kittens, of which some were quite white; others more or less mottled, tabby, &c. But the extraordinary circumstance is, that of the offspring produced at one and the same birth:—such as were like the mother, entirely white, were, like her, invariably deaf; while those that had the least speck of colour on their fur as invariably possessed the usual faculty of hearing." I have not read of any instance of a mute albino in the human race; but I have observed albinoes in families, other members of which were mute, and in which the parents were related.

Among the lower orders there are many superstitions regarding the deaf and dumb, who are believed to be otherwise gifted, as a compensation for their misfortune. This idea is generally turned to account, particularly by strolling dumb beggars, in fortune-telling, charm-working, and in the discovery of theft. Muteism is on this account often assumed; and many impostors have been detected in this character. Dalyell, in his "Darker Superstitions of Scotland," says:—"In this country the faculty of prediction has been associated with the dumb; and, as of old, it originated from a vision. The devout connected some

communion with the Deity, or with the ethereal world, during suspension of human faculties. Thence Daniel, in a vision, 'became dumb;' and Zacharias, a priest, was speechless for nine months from having seen a vision in the temple." The popular terms for deaf-dumbness are:—Deaf and dumb; a dummy; the silent people; mute; and, in the Irish tongue, *bodhar agus balbh*, "deaf and dumb."

It is often difficult to discover whether the person is really deaf and dumb, and several people have carried on the deception for years. Sir Walter Scott's character of Fenella, in "Peveril of the Peak," is a well-drawn instance of long-sustained deception of this nature. Sometimes, however, the imposture has been detected by so simple a means as suddenly asking persons how long they were dumb. Sicard is said to have detected an assumed mute who was accused of some offence, by causing him to write,—his spelling showing that he had learned by ear, and not by sight. The man was convicted on this evidence; but, in my opinion, most unjustly: for, as every teacher of the deaf and dumb is well aware, even the most educated of that class make errors in spelling as well as orthography.

Is the mortality greater among the deaf and dumb than the rest of the community with whom they happen to be placed; and are mute persons more liable than others to particular diseases? The only answer to this question is that afforded by the recent Irish Census returns. From the 30th of March, 1851, to the 29th of February, 1852, 77 mute persons (35 males and 42 females) died,—that number being about the average mortality in 4151 persons, at all ages, in this country, for eleven months, or nearly 1 in 50 per annum. In addition to these, many other deaths of deaf mutes were afforded by the returns, in which the diseases, ages, and sexes, were specified,—in all amounting to 291; and the Table formed thereon, although it affords no additional evidence to the foregoing as to the rate of mortality, yet enables us to form a well-founded opinion as to the most prevalent diseases and casualties among this class. Of 217 deaths, of which the causes were specified, 72 occurred from zymotic diseases,—the two heaviest items among which were, fever, 26; and dysentery, 19. 135 occurred from sporadic diseases; among which consumption bore an undue proportion, prevalent as that disease is in the British isles, and thus confirms the oft-expressed opinion, that deaf-muteism is but one of the varieties of struma: 77 deaths (34 of males and 43 of females) were registered under that head. The females predominated in this class over the males by 15; whereas the males exceed the females almost as 2 to

1 when the deaths occurred from epidemic diseases. Ten cases were registered under the head of "Violent or sudden deaths." Large as this proportion seems at first sight, it will not appear too much when we take into account the greater liability to accidents of persons altogether devoid of hearing. It would form an interesting subject of inquiry, and one which I hope will have due weight with future investigators, to ascertain whether there is a greater amount of mortality among uneducated than educated deaf mutes: we require, however, a much more extended field of inquiry, and a greater accumulation of facts, than have as yet been recorded upon this subject, to be in a position to offer an opinion thereon.

It now only remains briefly to allude to some of the questions which, in a legal point of view, affect the deaf and dumb. Modern divines have not, so far as I am aware, laid down any dogmas with respect to the position in a religious point of view of an uninstructed deaf mute; but that an educated mute may be admitted to all the privileges of the Roman Catholic Church we learn from the fact related by De Ponce, that one of his pupils took orders, and possessed a benefice (see p. 440). With respect to baptism, the question can seldom arise owing to the infancy of the mute; but even in the case of adults, provided others make profession for them, it is stated, in J. Paulo Lancellotto's "Institutionum Juris Canonici," that they can be baptized. Deaf-mute persons may, according to our present ecclesiastical law, contract marriages, in which they may give their consent by signs. A deaf mute can also inherit property, and, as the law now stands, give evidence and make a will. These are great improvements upon the ignorance and barbarism of other times, when the law regarded the congenital deaf mute in the light of an idiot; and even to this day the person deaf, dumb, and blind is so styled.

We have not as yet a sufficient amount of statistics before us to say whether more crimes are committed by educated or uneducated deaf-mute persons, or by the entire of this class, compared with a similar number of persons in the same walks in life who possess both speech and hearing. An uneducated deaf and dumb man was tried at the Spring Assizes of 1852, at Downpatrick, for the murder of his brother, by stabbing him with a knife in a fit of passion. The only means of making the prisoner understand the nature of the proceedings, or the evidence against him, was through the medium of signs; for which purpose, one of his neighbours, who was accustomed to communicate with him, was employed as an interpreter. The man was

found guilty of manslaughter, and sentenced to twelve months' imprisonment. Another trial of a deaf mute, for larceny, occurred in the same place in 1840; and a similar course was pursued. See Crawford and Dix's Reports, p. 402. A third deaf-dumb person was also tried for theft at Downpatrick in 1852, but he was educated, and pleaded guilty. According to the Brehon Laws, a deaf mute could not appear in any way in a court of justice.

Herder, in his "Philosophie der Geschicte der Menschheit," says:— "The history of uneducated deaf mutes shows how rarely men can rise to the exercise of reason when deprived of the faculty of speech: they remain, in fact, within the mere limits of animal instinct. A deaf mute will imitate whatever he sees, whether good or bad, just like a monkey; though he is, indeed, sunk lower even than the animal, for the instinct of sympathy with his own race is wanting in him." As an instance of this, he cites the case of a born deaf mute who murdered his brother after he had seen a pig killed, simply from the instinct of imitation, and even rooted in the entrails with a savage, senseless pleasure; and, adds the author—"This is a horrible proof how little our vaunted human reason and sympathy with our species can effect when dissevered from the faculty of speech."

When bills of indictment have been found against a prisoner by the Grand Jury, he is then arraigned at the bar, desired to hold up his hand, to answer to the name under which he is indicted, and called upon to plead. If, upon his arraignment, the prisoner does not answer, it becomes a question whether he does so of malice, or is mute by the visitation of God. The court will, in such a case, direct a jury to be impannelled, who are immediately taken by the sheriff from the bystanders; a special form of oath is administered to them, and the prisoner's counsel may call witnesses as to the fact of muteism, &c. Where the jury find a verdict of "mute by the visitation of God," and that the prisoner is of competent intellect, and can be made to understand the nature of the proceedings against him, the trial may proceed. If the prisoner can read and write, he is handed the indictment, and the usual questions are addressed to him in writing. After he has pleaded, and stated in writing that he has no objection to any of the jury, the trial may proceed. The judge's notes of the evidence are given to him after the examination of each witness, and he is allowed to put questions in writing; but if the prisoner is uneducated, then some one, either in the habit of communicating with the deaf and

dumb, or acquainted with the prisoner's peculiar mode of signing, is usually employed to explain to him the nature of the evidence, &c.

When a deaf and dumb prisoner cannot be made to comprehend the nature of the proceedings and the details of the evidence, the usual course is, after the jury have found him "mute by the visitation of God," to re-impannel the jury, to inquire whether he is able to plead to the indictment: and if that issue be found in the affirmative, then they are re-sworn again to inquire if the prisoner be sane or not; and if the jury find him insane, the judge will order him to be confined under the statute in that case made and provided. But, suppose the jury find that, although sane, he is, from incompetency and want of education, unable to plead, he cannot by the common law be put upon his trial; but the judge may order him to be kept in confinement, as, peradventure, he may at some future period be made to understand the nature of the charge.

Thus "there are three points to be inquired into in all such cases: first, whether the prisoner is mute of malice or not; second, whether he can plead to the indictment or not; third, whether he is of sufficient intellect to comprehend the course of proceedings at the trial so as to make a proper defence."*

A witness, though deaf and dumb, may be sworn, and give evidence upon an indictment, if intelligence can be conveyed to and received from him by means of signs and tokens.

* Alderson, B., *Pritchard's case*, 7 Carrington and Payne's Reports, 503. See also *Dyson's case*, ibid. 305.

To the instances of persons deaf, dumb, and blind, alluded to at page 476, may be added the interesting case of Margaret Sullivan, of the Rotherhithe Workhouse, related by Dr. R. Fowler, in two papers read to the British Association, and printed in the Reports of that body for the years 1841 and 1842; and also in "Some Observations on the Mental State of the Blind and Deaf and Dumb," suggested to that author by the foregoing case (Salisbury: 1843).

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